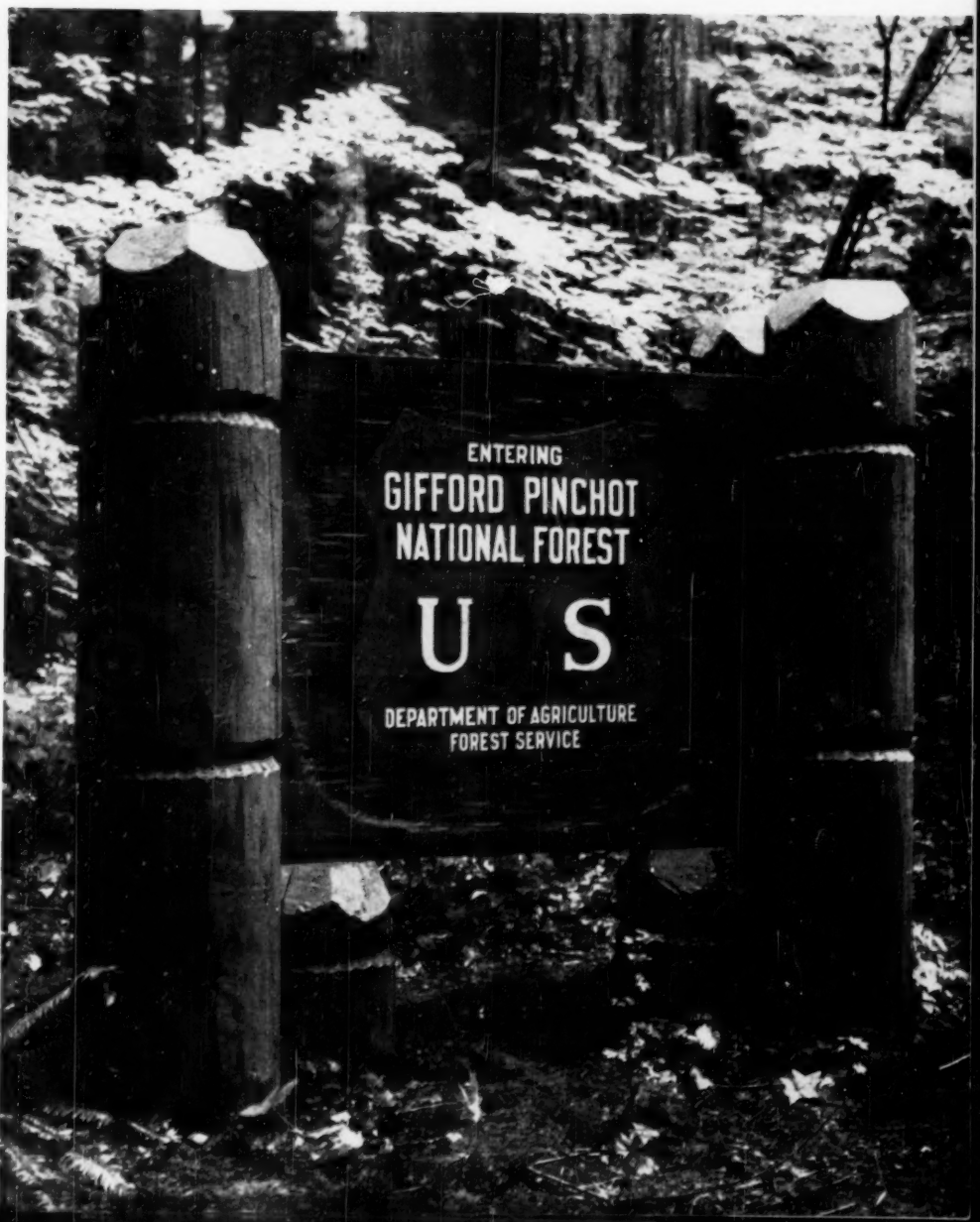
Journal of FORESTRY

FEBRUARY 1950



SOCIETY OF AMERICAN FORESTERS 1900

Volume 48
Number 2

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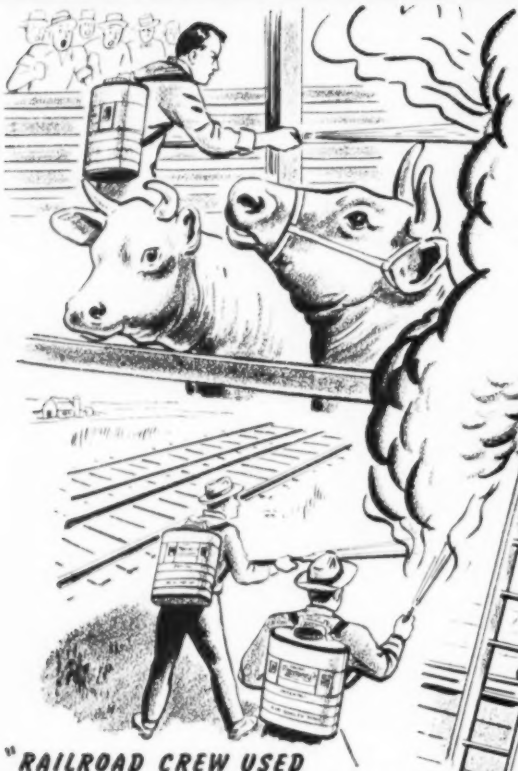

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Journal of Forestry

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Photo courtesy U. S. Forest Service

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Mr. Lloyd Thorpe
National Advertising Representative
Journal of Forestry
Seattle, Washington
Dear Mr. Thorpe:

I am glad to learn that the Journal of Forestry is to have the advice of an advertising man for increasing its lineage of advertising. I was editor of the Journal of Forestry myself for several years and felt then that the Journal offers a special medium for acquainting foresters with the growing list of tools, machines, supplies, etc., that are used in forestry work. The Journal then had a very modest circulation. Today it is several times larger and it is a safe guess that every active practicing forester in a position of responsibility sees the Journal regularly and uses it for reference.

Forestry is a growing profession. Each year more private timber owners and operators adopt forestry methods and employ foresters. It is an accelerating development. The potential volume of forestry equipment and of the kind of logging equipment that best serves the requirements of forestry is quite large. Many of these purchases will be authorized and made by foresters.

There is another field in which I believe the Journal's advertising pages should be used. More than half the foresters in the U. S. are federal employees and not familiar with the development of forestry in private lands. It is important that this class be better informed on private efforts and accomplishments. It is a desirable, and I believe, important kind of public relations work which should be of value to companies engaged in forest management. For such, I particularly recommend the Journal of Forestry.

Yours truly,

Emanuel Fritz

EF:hb

This is one of a series of advertisements published by the Society of American Foresters for the purpose of acquainting the membership with the advertising potentialities of their JOURNAL OF FORESTRY.

Journal of Forestry
Official Organ of the Society of American Foresters

"The Greatest Good of the Greatest Number"

Lyle F. Watts
Chief, Forest Service, U. S. Department of Agriculture, Washington, D. C.

This address was given at the dedication of the Gifford Pinchot National Forest in the State of Washington, held at La Wis Wis Forest Camp, 116 miles south of Seattle, on October 15, 1949. The name of the Columbia National Forest was officially changed to Gifford Pinchot National Forest by proclamation of President Harry S. Truman on June 15, 1949. The dedication followed the annual meeting of the Society of American Foresters in Seattle during October 10-14. Participating in the ceremonies, in addition to the chief of the Forest Service, were Horace J. Andrews, regional forester, Portland, Ore., Governor Arthur B. Langlie of Washington; Cornelia Bryce Pinchot of Washington, D. C. and Milford, Pa.; and Clyde S. Martin, president of the Society of American Foresters.

IN DEDICATING the Gifford Pinchot National Forest today, we honor one of America's great men.

It was Gifford Pinchot who gave conservation its first great impetus in the United States. It was largely through his tireless crusading efforts that conservation has become a part of our national policy. The ideas and forces that Gifford Pinchot set in motion may well determine the future security and prosperity and progress of this nation. They may indeed determine the future welfare of the entire human race.

There are many here today who knew and worked with "G. P.", as Mr. Pinchot was familiarly and affectionately known to all his associates. They remember G. P. as a man of tremendous energy and enthusiasm, as an inspiring leader, as a zealous crusader. They knew him as a courageous, unflinching fighter in the public interest and for the public good. His cause did not need to be popular if it was right. He seemed at times to be fighting almost singlehanded; but history has shown that the people were behind him.

Mr. Pinchot was the first chief of the United States Forest Service. He was the first American to hang out his shingle as a consulting forester. He engineered the first Conference of State Governors for the consideration of conservation policies. He promoted the North American Conservation Conference, the first conservation meeting on an international level. He was a cofounder of the Society of American Foresters.

Although Mr. Pinchot was a man of many interests and many capabilities, forest conservation was his first and greatest concern. When he spoke to a group of foresters a few years ago he said, "I have been a governor now and then, but I am a forester all the time—have been, and shall be to my dying day." He was indeed. At the time of his death in 1946, he was working over the management plan for the forests on his own land. In his last years, Mr. Pinchot suggested and promoted a world-wide conservation meeting—the initial impetus for the United Nations Scientific Conference on the Conservation of Natural Resources held at Lake Success in August and September 1949.

Progress Made

The conservation movement, which Gifford Pinchot played such a big part in launching, has made much headway. Today we have a splendid system of national forests making many important contributions to local communities and to national welfare. The timber and other resources of these national forests are managed for a sustained yield, for permanent and continuing production and use in the public interest. Our national forests are furnishing an increasingly significant portion of the country's timber supply; they are protecting vitally important sources of water; their grazing lands contribute to the nation's supply of meat, wool, and leather; they afford recreational opportunities for millions of people. Their returns to the public in timber production, water supplies, flood control, livestock production, wildlife, recreation, and other services far exceed the costs of administration. It would indeed be difficult to place a dollars and cents value on many of their services and benefits.

We have in the various states, many strong, competent state forestry departments that are doing notable work in forest protection and development. Fifty years ago, when Gifford Pinchot was beginning his crusade for forestry, only feeble beginnings had been made in systematic protection of the forests from fire. Today, state forestry agencies are heading up a cooperative program that provides organized protection for a total of some 340 million acres of state and private forest land. State forests have been established and developed by many of the states, and in many other activities state agencies are doing a good job for the advancement of forestry.

And so are many private owners of forest land. The forest management programs of a number of lumber and pulp and paper companies are noteworthy. The forest industries have sponsored a tree farm program in which hundreds of forest owners have signed up, pledging to manage their timber holdings for continuous production.

I have mentioned these advances in forestry particularly because they are the things with which I am most familiar and most directly concerned. There have been many other noteworthy advances in conservation. An aggressive program of soil conservation is underway. Wildlife management has made great strides. Deer and elk have made such a strong comeback that in some areas the problem is now to control excess populations instead of bringing back the vanished herds.

All of these things add up to an impressive total of achievement. Conservation is definitely on the move.

But we still have a long, long way to go. There is nothing in the record to justify any complacency. For the United States as a whole, we have yet to reverse the downward trend of our timber resources. The annual drain of sawtimber, though below a desirable goal for future production, still exceeds the rate of growth. Furthermore, much of the drain is of high-quality old-growth timber, and especially of the more valuable softwoods needed for construction lumber, plywood, and other important uses; whereas much of the growth is of inferior kinds of hardwoods and other poor quality material. Millions of acres capable of producing high-grade timber now have only a scrubby, almost worthless growth. The general quality of our timber stands is steadily deteriorating.

Despite the excellent forestry programs of many forest owners, the fact remains that only 36 percent of all this country's operating private commercial forest land is being handled according to practices that assure the forest being kept in reasonably productive condition. Sixty-four percent of the cutting practice must be classed as poor or destructive.

The average grazing capacity of our western ranges is little more than half of what it was originally, or of what it should be now. Many ranges are badly deteriorated; in some areas nutritious perennial grasses have almost wholly disappeared; fertile top soil is being washed or blown away, increasing the difficulty of restoring range and watershed values.

Nearly all our major rivers run muddy, much or all of the time. When you see a muddy river, you are seeing soil from farms and hillsides being carried off to the sea, or to be deposited along the way to clog stream channels or silt up the reservoirs. Every year, raging floods take a toll of human life and cause millions of dollars worth of property damage. A lot of this damage could be averted by more adequate attention to the watershed lands where the floods come from. Some watersheds have so deteriorated that a flash flood may start from less than an inch of rainfall.

And while too much water is wasted in floods, adequate, dependable water supplies for irrigation, industrial, and domestic use are becoming an increasingly acute problem in many parts of the West, and even in some parts of the more humid East. Many streams that are raging torrents during a rainy season dry up soon after because not enough water gets into the ground to feed a steady flow. Many valley wells go dry for the same reason.

Such things as these indicate the big jobs ahead in conservation. If I sound like an alarmist at this moment, it is because I believe there is cause for alarm. In the face of a growing population our natural resources are declining. You cannot build an expanding economy on declining resources.

But I see no need for defeatism or despair. We know which way we should go. Gifford Pinchot and other early day conservationists long ago pointed the way. They were the pioneer pathfinders who first signposted what William Vogt, in his recent thought-provoking book, has called the *Road to Survival*. We *can* build up depleted resources. We *can* see that renewable resources are so managed that they will be continuously renewed. But it will take some aggressive, forthright action.

Action Needed

We need aggressive action to control unwise or destructive timber cutting—to establish certain basic rules of practice that will assure continued productivity of the forests. Some 14 states have already enacted legislation looking toward such regulation of forest practices. Their regulatory laws vary greatly in effectiveness and administration. We need nationwide standards and action on a nationwide scale to protect progressive owners from destructive competition, to stop further forest destruction and deterioration, and so help to maintain a reasonable growing stock as a basis for future timber production. This need was clearly foreseen by Gifford Pinchot. It has grown more urgent with the passing years.

We need also to tighten up still more our protection of the forests from fire. We need more protection work against destructive insects and diseases.

Along with such urgent defensive measures, we need positive action on a big scale to restore and build up resources. We need intensive education and other cooperative services to help forest owners improve their forests and practice real sustained yield management. We need to strengthen the public forests. We need to eliminate overgrazing and build up run-down ranges. We need to improve the condition of many watersheds. We need to replant or reseed millions of depleted acres to restore them to productivity.

And we need to get on with these things *now*. Time is marching on. For a century and more this country has been taking much from the land but putting little back. We cannot keep on that way indefinitely. We have grown rich in worldly goods, but we are getting poorer in the natural resources that are the basis of those goods. And the longer we delay, the bigger and costlier will be the job of restoration that will have to be done if we are to maintain our high living standards and our strong place in the family of nations.

Ours is a nation capable of doing things in a big way. We should aim high. Our goal should be continued abundance, not just to get by.

The Forest Service Tradition

When Gifford Pinchot was chief forester, the guiding principle was

laid down that our national forests should be managed for the "greatest good of the greatest number in the long run." That principle has meaning not only within the boundaries of the national forests. It should motivate all public action. That the public has a stake in *all* natural resources was basic in Gifford Pinchot's thought. He strove to awaken realization of the fact that ownership of the land does not justify its abuse; that we of this generation hold the land in trust for the generations to follow; that it is our responsibility to see that it is used wisely, that it is kept productive.

One of Gifford Pinchot's achievements was in setting a high standard of public service. Under his leadership the Forest Service gained a fine reputation for unselfish zeal and devotion. Power, prestige, or pay were not the dominant forces that motivated its actions—the public interest came first. Mr. Pinchot and his men did not stoop to subterfuge, special favors, or secret agreements. Their fight was honest and above board.

I think I am justified in saying, and I say it proudly, that the Forest Service still carries on in those traditions. Today, we rededicate ourselves to those high standards. We shall not shrink from responsibility. We shall not be afraid of leadership in public policy. We cannot be content to drift with the tide. In the management of this national forest and of all other national forests, in our efforts to promote wise use of natural resources and sound conservation everywhere, our goal and guiding principle will continue to be the greatest good of the greatest number in the long run.

Our entire national forest system, embracing more than 180 million acres in the United States and its territories, is, in a large sense, a monument to Gifford Pinchot. But to this beautiful forest in the Cascades of Washington has come the special honor of bearing his name. This national forest was established when he was chief forester. Its administration began under his direction. The basic principles for its management were set up under his guidance.

May the Gifford Pinchot National Forest help to keep forever alive and dynamic his conservation ideals. May it help point the way to wise use of all forests and all resources in the attainment of the good life for all men and all nations.

Gifford Pinchot and the Conservation Ideal[1]

Mrs. Gifford Pinchot
Washington, D. C.

YOU WILL understand how hard it is for me to speak on this occasion, even to thank you for the thoughts you have so beautifully expressed and the tributes you have so generously paid. I know that every word has been heart-felt. Surely you realize how profoundly grateful I am.

Each one of you, the foresters, Governor Langlie, the soil conservationists, the engineers, have expressed, in your own separate fashions, something of the essence of what was Gifford Pinchot in the various fields in which you knew him. I can add nothing to what you have said.

But there is one point I am concerned to bring you which has not been stressed here. That is the ideal of conservation that was so truly born of Gifford Pinchot's mind and spirit. The conservation philosophy from which he derives his temporal and earthly immortality.

Beyond preservation of the forests, beyond reclamation of the soil, beyond the various techniques of land use and flood control, over and above and back of all of these stands the philosophy itself, the philosophy of conservation.

Conservation to Gifford Pinchot was never a vague, fuzzy aspiration. It was concrete, exact, dynamic. The application of science and technology to our material economy for the purpose of enhancing and elevating the life of the individual. The very stuff of which democracy is made.

The conservation he preached dealt not only with trees—it dealt with the sheep herders and the homesteaders whose means of livelihood in the forest depended upon the kind of protection that was given them. It dealt not only with erosion and flood control, but with the wise use of the land, with the development of the great river valleys in terms of irrigation and power, such as you are so magnificently working out with your Grand Coulee and Bonneville dams.

It dealt with research, with programs of improvement of country life, with electrification of farms, with rural education. It dealt with equality of opportunity, with control of monopoly. The list is a long one.

Most important, it dealt with the conservation of natural resources as an international problem affecting issues of permanent peace.

To Pinchot, you see, man himself is a natural resource. The basic resource for whose material, moral and spiritual welfare the Conservation doctrine is invoked. Man, without whose energy, the energy of coal and oil, of electricity, yes of atomic science itself, is inert and meaningless.

Believing, as Pinchot did, that the planned and orderly development of the earth and all it contains is indispensable to the permanent prosperity of the human race, conservation in its widest sense became to him one of the guiding principles through which such prosperity might be achieved. A bold creative affirmation in spiritual and ethical terms, of our faith in the dignity of man as a

[1] An address delivered at the dedication of the Gifford Pinchot National Forest on October 15, 1949.

child of God.

Pinchot was trained as a forester, he thought as a forester, he felt like a forester. But before he had practiced forestry long, he realized that there were questions with which he as chief forester was called upon to deal—questions that on the face of them might seem to have little to do with trees.

In his autobiography he writes about going out some 42 years ago "in the gathering gloom of an expiring day to ride in Rock Creek Park," and of taking with him on that ride the difficult problems upon which he was constantly at work.

Particularly he was thinking of the relation of the forests not only to streams and erosion, but to inland navigation, to water power developments, to fish and game, to recreation. He was thinking of the danger of monopoly of control of natural resources, about abuses in the exploitation of mineral deposits on public lands, about river valley developments, about soil conservation, about better agriculture.

What had these to do with forestry, he asked himself, and what had forestry to do with them? What was the basic link, if any, between them all?

Suddenly the idea flashed through his mind. "Here are no longer a lot of different, independent, often antagonistic questions, each on its own separate little island" as he, a forester, had been in the habit of thinking. Instead there is one central question, many-sided yes, but still a unit. All so closely connected as to make it imperative they be coordinated and treated as part of a single coherent plan.

Seen in this new light, these separate issues fitted each into the other to make up one central problem—the use of the earth for the good of man.

To him it was "like coming out of a dark tunnel." He "had been seeing one spot of light ahead, and of a sudden the whole landscape rushed into visibility."

It was a new policy that was needed. A policy not exclusively national, but one world-wide in its scope. A policy that involved not only the welfare of man but his very existence on earth. An international policy in which all nations must eventually cooperate for their fullest development.

In these terms conservation becomes a matter not primarily of techniques (as some moderns seem to think), but of democratic policy. Of government policy on the highest level.

Possibly there are some of you old timers here—the old timers he loved so well—who still remember the great meeting in 1908 called at the instigation of Pinchot by the then President Theodore Roosevelt.

I want to digress here a minute to take the opportunity of bearing witness of how deeply Gifford Pinchot felt always about the debt he owed to the men of the Forest Service. Over and over again he said that to them, to the old timers, belonged the real credit for what had been accomplished. Never before or since, he said, had such high morale, such devotion to the public good, such creative ability been demonstrated in any government body. It was a three way cooperation enterprise—the foresters at one end, the American people at the other, Gifford Pinchot in the middle.

After forty years this spirit still persists, still animates the Forest Service. Today this Service is still outstanding in its high morale, its devotion to duty, its creative and imaginative leadership. It still sets a pace that many government departments might be well advised to follow.

Only a few weeks ago two men spoke to me in glowing terms of the Forest Service as the best body of public servants in Washington. They both referred (in entirely different conversations) to its energy, its courage, to the selfless devotion and drive of its personnel. They felt that the Forest Service stands today perhaps highest of all government organizations.

But to go back to the conservation meeting in 1908; there for the first time in history the idea of conservation was spelled out to the American people in terms so simple as to be understood by all.

First they were made to realize that our natural resources are not inexhaustible. That, on the contrary, these are being destroyed and wasted at a rate that is disastrous and may soon become fatal.

The point was then driven home to the people that the natural resources of the country are a national heritage, to be made use of in establishing and promoting the welfare, the prosperity, and the happiness of the American people.

Hitherto, said the President, our national policy had been one of almost unrestricted destruction of these resources. It was a policy that had led and was leading to exhaustion of many of them. Moreover, it was a policy that gave unequalled opportunity for private monopoly. And "monopoly can no longer be tolerated" he proclaimed over and over again.

"In the past," Roosevelt continued, "we have admitted the right of the individual to injure the future of the Republic for his own present profit. The time has come to put an end to such exploitations . . ."

Always the protection of the rights of the people marched side by side with the technology of forest management, with the development of water power, extraction of minerals, etc.

Always the emphasis was laid upon the social purpose of conservation, the greatest good to the greatest number for the longest time. Always the conception stressed that conservation is not a series of independent issues, but one central problem to be faced and solved as such.

Two years later Gifford Pinchot projected his insight into the conservation philosophy still further. This time to the international field. To the relationship between conservation and the question of peace.

Why, in the long role of history, had man so persistently gone out to do battle with his fellow man? Could certain central issues be traced that underlay and explained these endless wars?

Obviously from time immemorial men had fought either to grab from their neighbors or to defend their own possession, of the best hunt-

ing grounds, the most fertile plains, of protected harbors, of lands richest in mineral deposits. In early days the thinking was in terms of iron, copper, gold; later coal and oil were included. Today nations are turning covetous eyes on rubber, on deposits of tin, manganese, chrome, molybdenum, bauxite and uranium (except for rubber, natural resources, all of these —nonrenewable resources at that).

No single nation is self-sufficient in all the essential raw materials it needs, Pinchot pointed out. The welfare of each is dependent upon access to those it lacks—access without recourse to war. Moreover, the world is beginning to understand that, instead of its being in the interest of any one nation to see another depressed, it is to the interest of each and all to see the rest secure.

Could such access to raw materials be brought about by mutual consent on an international basis?

Well, Theodore Roosevelt, Franklin Roosevelt, President Truman, each one in his time believed that conservation on the international level could and would help to remove one of the most dangerous of all obstacles to a just and permanent world peace. They believed that international cooperation in conservation objectives most certainly would be of basic advantage to the entire world.

In 1909 a formal invitation was sent out by Theodore Roosevelt to 48 nations to join together in an international conference on the subject of natural resources and their inventory, conservation, and wise utilization.

Some 30 of these countries, including among them Great Britain, France, Germany, Canada, and Mexico, accepted. Most unfortunately, however, for the cause of peace, Roosevelt's successor, President Taft, whose failure to support domestic conservation precipitated a major political revolt, decided to recall the invitation and to kill the conference.

Wilson, Harding, and Hoover were in turn approached but all failed to act.

In 1944 we went to see Franklin Roosevelt. The story of that meeting is both exciting and dramatic. For F. D. R. with his broad and imaginative understanding of history, grasped and immediately welcomed the full significance of the idea. Pledged himself to the calling of such an international conference and asked how soon it might be put through. He authorized Pinchot to draw up an agenda, and to draft whatever government officials he might want for the doing of it.

In a letter to Cordell Hull, dated October 24, 1944, F. D. R. wrote:

"In our meetings with other nations I have a feeling that too little attention is being paid to the subject of the conservation and use of natural resources. I am surprised that the world knows so litle about itself. . . . It occurs to me, therefore, that even before the United Nations meet . . . it might do much good to hold a meeting in the United States of all of the united and associated nations . . . I repeat again that I am more and more convinced that Conservation is a basis of permanent peace. I think the time is ripe."

After F. D. R.'s death, President Truman, who had given the matter much close personal attention, went ahead on it. In August 1946, he sent to the United Nations as the American plan a formal proposal for such a conference.

This conference so conceived and so born took place last August at Lake Success. It was known as the Conservation and Scientific Conference. The story of this conference is a tragic one too long to go into here. Suffice it to say the moral and social, the economic and political objectives of conservation, its democratic significance were rigidly ignored by the men of little faith and many fears who organized the conference. Even more unbelieveable, all mention of peace and war in relation to conservation was deliberately and definitely excluded from the agenda.

The sterile mouse that emerged, while excellent on the technical side and adequate enough on most of the scientific, had obviously no right to lay claim to the name of conservation in which it was conceived.

So deplorable a retreat from so noble an opportunity was bitterly resented by many of the delegates who had been looking forward to a great upsurge of sentiment from the peoples they represented. Delegates who understood what such developments as TVA (and those you are so imaginatively building here on the Columbia River) might mean, do mean, in terms of inspiration to literally hundreds of millions of impoverished and hopeless people of Europe, Asia, and Africa.

However, to dwell too narrowly and too long on the details of the past, while it may be good history, it is not necessarily, sound conservation. By which I mean that the problems of today differ at least in many superficial ways from those of yesterday.

No one understood better than Gifford Pinchot that the battlefields of the future in certain respects must necessarily take different forms from those of the past.

For one thing many concrete victories have been achieved since conservation was first promulgated as an American doctrine—victories that will stand for all time. In the intervening years new and breathtaking techniques have been worked out, scientific truths laid bare, that were not even foreshadowed in those early days. Even more important, new problems that are constantly arising—new needs of the American people that are coming into being. Problems and needs that demand new applications of the Conservation philosophy.

The C.C.C. camps, the shelterbelts, some of the recent techniques in the development of the TVA and the Columbia River are cases in point. As is the bold new doctrine of President Truman and his statesmanlike vision in building up the peoples of backward nations. All of which hold inspiration and great hope for the future.

Gifford Pinchot was always the first to proclaim the principle of growth, of development, and of renewal as central to the conservation idea.

He insisted that conservation must be reinvigorated, revived, re-

manned, revitalized by each successive generation. Its implications, its urgencies, its logistics, translated in terms of the present by each of them. Always he pointed out that the victories and achievements of Conservation must never be regarded as an excuse for complacency, but only as an incentive to further goals.

He, therefore, welcomed the rediscovery of conservation by successive presidents and political leaders. Conservationists, you know, believe in the renewal of natural resources. And such political renewals constitute of themselves a prolific resource in our national political life.

Conservation is today more than ever a philosophy of dynamic democracy. Still to be conceived not only in terms of science and techniques, but primarily in relation to men and to women to their needs, their aspirations, their social demands. That fact is what gives conservation its basic unity. As such it is central to the domestic and international objectives of the American people.

With his deep insight into the well-springs of democratic action, with his abiding concern in the ethical and spiritual bases of American life, Gifford Pinchot provided the initial leadership in applied conservation.

Fearless, zealous, practical, and creative, a man "who never turned his back, but marched breast forward" he blazed the trail.

Upon those of us who are left, upon the young men and women of the future rests the responsibility and the glory of the long march ahead to greater opportunity—to more perfect freedom.

Dedicatory Remarks by the President of the Society of American Foresters

The Society of American Foresters considers it a privilege to take part in this dedication ceremony of the Gifford Pinchot National Forest.

Gifford Pinchot was not only the first native American to be technically educated as a forester, but his foresight and drive made possible the creation of a forestry profession in the United States. In a short fifty years, foresters have already made a great contribution to the welfare of this country.

As the man more responsible for the organization and development of our great national forest system than any other person, it is very appropriate that one of the finest of these great forests should bear his name. There could be no more fitting monument to Mr. Pinchot's memory than this magnificent living forest.

Therefore, as a representative of forestry's professional society in this country, I am happy to be here to do honor to a great American forester.

C. S. MARTIN, *President, Society of American Foresters.*

The Story of Keep Oregon Green[1]

Arthur W. Priaulx

Public relations director, West Coast Lumbermen's Association, Portland, Oregon.

KEEP OREGON GREEN is admittedly an eye-catching slogan. To a million and a half Oregonians since 1940 it has become a symbol of good citizenship, a constant reminder of man's responsibilities as guardian and protector of our state's vast forest heritage, a public service activity to be supported along with the schools and the church.

Keep Oregon Green is unquestionably the most often quoted, the most frequently printed, and the most widely broadcast three words in our state's collective vocabulary.

Pick up any one of our 125 newspapers, from the smallest weekly in the most remote community, to our two large metropolitan dailies in Portland, from May to late September hardly an issue but carries the message of Keep Oregon Green. Front page news stories, photographs, advertisements sponsored by local business firms, editorials, editorial cartoons, short fillers, small single column pictographs—all carry the story of preventing forest fires.

Come into our state by car and at each of the major points of entry a massive timbered sign welcomes you as a visitor at the same time asking your cooperation with fire. Turn on your radio and during critical fire periods every one of the 37 radio stations in Oregon will warn you that this is fire weather. You will be asked to use your ash tray, to watch out for fire while traveling in the woods. All day long, at station breaks between newscasts and popular programs, and even sandwiched in between songs and comics, radio spot announcements will ask your cooperation in Keeping Oregon Green.

Stop at a hotel or restaurant and chances are better than even that a Keep Oregon Green ash tray will grace the table or counter. Along the highways, every few miles, neat green-and-white signs ask your cooperation in preventing forest fires.

Giant billboards, paid for by Shell Oil Company and other national advertisers, carry the same message, as do A-sheet showings at service stations. With your bank statements in July and August comes an appealing cartoonograph stuffer, more than 500,000 to citizens of Oregon with bank accounts, reminding you that fire weather is danger weather.

Turn off the highway into picnic areas, resorts, service stations, into stores throughout the state and some form of our green tree emblem will catch your eye. Side roads and secondary highways are effectively, but not offensively, placarded with the symbol. In case you do not have your radio on while traveling, you may still get your gentle, effective reminder to Keep Oregon Green, for the car up ahead of you will probably have a KOG license plate affixed just above the state plate.

We have used hundreds of other devices to tell our story and I will discuss some of them in more detail later. But it will be difficult for me to be modest in my discussion. I hope you will pardon my seeming pride in our accomplishments and not mistake it for boasting. Actually, the amazing and rather startling results of our ten-year program in Oregon in keeping our state green are so impressive as to be almost unbelievable.

Origin of the Movement

When it was first proposed in 1939 to fight forest fires with publicity the idea was greeted with something less than enthusiasm, and among the more hardened loggers with the very same noises heard years ago when word got around the camps that a logger was seen playing golf.

While most of my remarks will be confined to the Keep Oregon Green program, how we operate it and the results obtained, I shall digress occasionally to discuss the work of Keep Washington Green. We did not actually invent the Keep Oregon Green idea in Oregon. The plan, like the Tree Farm program, originated in Washington. In 1940, W. B. Greeley, a great forester and a man with a vision, haunted by the fearsome havoc being visited on Washington's forests every year by man-caused fires, developed with Governor Clarence Martin a plan for a meeting of industry leaders and officials at Olympia. An action plan was needed.

Called to this historic gathering were some of the state's key men in protection and forestry—men like Charles S. Cowan, chief of Washington Forest Fire Association; James Stevens, writer and public relations expert; Corydon Wagner, president of West Coast Lumbermen's Association; Roderick Olzendam, public relations counsel; Edmund Hayes, public relations chairman of West Coast Lumbermen's Association; George Drake, chairman of the Joint Committee on Forest Conservation; Don Denman, forest products executive, and Fred M. Fuecker, adjutant of the Washington American Legion.

A year before, the American Legion, sparked by James Stevens, the legion's state forest marshal, had inaugurated a Junior Forest Warden program. The idea was to teach forest fire prevention to the youth of the state. Col. Greeley's committee, meeting with Governor Martin, praised this initial plan and felt the youth program should be maintained, but wanted a more extensive approach which would enlist all the general public to insure full effectiveness of any public education program.

From these discussions headed by Col. Greeley and Governor Martin came the Keep Washington Green organization. This was in February 1940. A leader was needed to spend his full time during the summer to make certain that the idea did not die in committee. Stewart Holbrook, one of America's leading writers, was in

[1] Presented at a meeting of the Division of Public Relations, Society of American Foresters, in Seattle, Wash., October 12, 1949.

Boston finishing his famed *Ethan Allen* when James Stevens telephoned him and invited him on behalf of the Keep Washington Green committee to take on the task of building an idea into a powerful and effective working organization. Within a month, Holbrook had the people of Washington all agog over this new movement. For four years he spent six months of each hot summer dreaming up new ways to get newspaper space, new ways to present radio shows and spot announcements, new ways to stop forest fires with publicity. Under Holbrook's adroit handling and fired by his enthusiasm, the program caught the public fancy.

Oregon Adopts the Plan

Edmund Hayes brought the plan to Oregon almost at once, and by mid-summer of 1940 a modest program was perfected with John Woods, Sr. carrying the brunt of the burden.

In May 1941, Governor Charles Sprague called together, at Portland, 250 state leaders to form a Keep Oregon Green Association. Dean Johnson, Toledo lumberman, was named chairman of an impressive board of citizens, and Edmund Hayes became chairman of an executive committee, a small compact group which determined policy, generated ideas, directed one full-time paid employee, a director who was hired the following year.

Being individualists, after we borrowed the Keep Green idea and put it to work in Oregon, we started off independently from the parent and original Keep Washington Green group, and developed our own methods of fighting fires with publicity.

Much of the success of the program in these two originating states has come from the strong rivalry which has existed between the Keep Washington and Keep Oregon Green committees. Each of us has tried to outdo the other. Each of us has cudgled our brains to come up with newer and bigger ways to sell fire prevention via the publicity route.

When our Oregon committee early decided to build a grass roots organization, instead of a big-name state committee, and set up Keep Oregon Green county committees with chairmen and full membership in each of the 36 Oregon counties, the Keep Washington Green group developed a community committee plan as well as a county committee setup to replace their former local organizations through the American Legion posts. We like our county committee idea and believe it has been one of the outstanding reasons for our success for through the medium of these local committees made up of leaders in every community, in every county we have been able to funnel our fire prevention material directly to the public. Keep Washington Green would not trade their ideas on community organizations for an advance look at our super-colossal, fire-defying 1950 model of Keep Oregon Green.

When Stewart Holbrook resigned six years ago to devote full time to his writing, Howard Brier, educator and nationally known writer of boy's fiction, took his place. He took up where Holbrook left off and building on Holbrook's remarkable publicity work with concentration on county and community committee organization has been a worthy competitor for Keep Oregon Green.

Organizational Setup

Our first Oregon director was Richard Kuehner, one of the nation's top 4-H club leaders, who did much of the early spade work, until called into Army service. Charles Ogle, with years of experience in fire protection, then took over, following a few month's interim fill-in work by Gene McNulty, who was called up by the Navy. A year ago Ogle resigned to follow other work and the Keep Oregon Green Committee employed Albert Wiesendanger, a 39-year veteran of the Forest Service.

Actual direction of our work and of our executive secretary, Albert Wiesendanger, comes from the 15-man executive committee, headed by Dean Paul M. Dunn of the Oregon State College School of Forestry. All protection agencies, public and private, are represented on the executive committee as well as timber owners, farm interests, and others. The governor of our state serves as president of our association which is quasi-public in character under the terms of our incorporation articles and charter.

A special radio committee named by the Oregon Broadcasters Association serves as policy and liaison between our association and the entire radio industry of Oregon. Each spring we meet with the radio station newscasters, program and station managers to map out our radio campaign for the year. Keep Oregon Green is the top public service activity of the Oregon radio industry and has brought national recognition to at least four of our stations and national awards in competition with all the radio stations of the nation. Tens of thousands of dollars worth of free time is given to our program in the form of spot announcements, dramatic presentations, national hookups, on-the-spot feature broadcasts, and locally-sponsored paid air time. Critical fire-weather news, logger fire-weather broadcasts, warning bulletins, some of them even cut into programs, are part of the astounding cooperation given our program by the Oregon radio industry.

A special newspaper committee serves in much the same fashion for the newspapers of our state. Three major wire services give unbelievable cooperation in getting fire weather information to the public through the medium of both the newspapers and radio stations. With our help, the U. S. Weather Bureau has developed an interpretive style of weather forecasting, translating dry weather facts into live news which newspapers more often than not now feature as front page copy.

One of the most gratifying features of the growth and development of Keep Oregon Green during the past ten years has been the high regard and acceptance accorded us by every agency and every group with which we come in contact. This high level of continuing support is due in large

measure to the dignity and sincerity and confidence which men like Edmund Hayes, Dean Dunn, Kuehner, Ogle, and Wiesendanger and the loyal members of the executive committee have been able to inspire. This devotion to a cause has caught fire among the members of the county committees and through them has been passed on to the general public. All of this has contributed to creating a frame of mind, a public-opinion—a response to fighting fire with publicity.

The widespread acceptance and support of Keep Oregon Green by the general public is one of the most remarkable demonstrations of mass education in the history of our state. While we would be the last to take full credit for the tremendous reduction in man-caused fires since 1940, the plain fact remains that until the KOG program got under way there had been no marked change in the wasteful destruction of our forests from this cause since our state was settled one hundred years ago. Our record is even more remarkable when you consider that our two states have gained almost fifty percent in population since 1940. More people are in the woods today than ever before.

Seldom has so much been done with so little. The results obtained from our modest budget of $20,000 a year, raised entirely by donations from the state, fire protection associations, loggers, lumbermen, businessmen, and the general public, have aroused the envy of advertising agencies and sales promotion organizations who marvel at the tremendous volume of copy and the universal support we obtain for our program.

"When the newness wears off, what are you going to do about keeping interest up?" an old-time advertising man asked me five years ago. The amazing fact is that the newness never seems to wear off. We have more ideas today than we had then for keeping our program effective. The state Junior Chamber of Commerce has taken on the KOG program as one of its top public service activities. So have the 20-30 clubs. The sportsmen's groups climbed aboard the KOG bandwagon this year. Fire underwriters have asked for a place in our movement.

The great danger in any publicity or public relations program such as ours is overdoing. We have to be constantly on the alert to make sure we are not becoming trite, not becoming like the common scold who loses effect by nagging redundancy. We have tried to "time" our releases to coincide with danger periods. We have tried to keep our radio copy fresh and seasonable.

Psychologically, we have tried to avoid the pitfalls of negativeness. All our literature, our placards, our advertising carries a positive note. Help Keep Oregon Green. Use your ash tray. Drench your camp-fires with water. We try to avoid the use of "don't." We seek cooperation and avoid the appearance of dictation. Our theme is always, "This is your show." One year we used the approach, "You, too, can be a fire warden." It's wise use of the old gimmick which never fails, audience participation.

Albert Wiesendanger is the key man in our unique organization and aside from a full-time office girl, is the only year-around employee, with an office in Salem.

The executive committee acts as the clearing house for ideas, and turns our meager and modest budget into a wide variety of advertising material. All this is funneled through our county committees. We supply them with signs, placards, gummed stickers, license plates, ash trays, signs, place cards, radio scripts, newspaper releases, school material. Every county committee is a regional factory of ideas. Each chairman extends himself to come up with new devices to keep his program lively and impressive. Here is loyalty and devotion which no other public service activity even approaches for it is not compressed into a few days drive such as obtains in community chest and Red Cross work, but extends through more than half the year on an intensive basis and through the winter on the planning stage.

Keep Washington Green gets the same amazing support from its local chairmen. These men attend several meetings a year, paying their own expenses.

Oregon Green Guards

One phase of our program has won us national recognition and continues to confound the experts.

In 1942, shortly after he took over direction of KOG, Richard Kuehner proposed a youth auxiliary to supplement the work of adult workers. Having a lifetime of 4-H club experience in dealing with youth, Kuehner put together the Oregon Green Guards. From the very first, Kuehner insisted that this was not to be just another youth organization but an activity which could be taken on by Boy Scouts, Girl Scouts, Campfire Girls, 4-H clubs, Future Farmers clubs, schools, communities, or small groups of boys and girls in rural areas or in cities.

We broke the story of the Oregon Green Guards in one carefully timed release through every newspaper and radio station in the state. Kuehner had worked up a Green Guard kit, which included a manual for members, an attractive membership card, an arm emblem, a gummed poster for the youth's home, and other stuff dear to the hearts of every kid.

Our state-wide release invited all boys and girls between eight and eighteen to join. Then came the deluge. Thousands of letters poured into Salem headquarters. Kuehner frantically called on the state forestry department for stenographic help to handle the addressing and mailing of the Green Guard kit. Rush orders went to printers for more manuals, armbands, and membership cards. KOG headquarters was a madhouse.

Kuehner pleaded, "Don't send any more publicity out on Green Guards. We've got 20,000 applications in already and, at 15 cents a head, we'll soon go broke trying to pay our way out of this deluge of requests."

Another news release would have flooded us, would have raised the

Green Guard membership to 50,000 or more eager boys and girls. The last thing Kuehner said to me when he went away to war was, "Keep quiet about this Green Guard activity and let the kids pass it along by word of mouth." The only publicity given to the movement in seven years is the annual invitation for kids to participate in the state-wide essay or poster contest.

Still the membership applications roll in. We have had to adopt a program of austerity, chopping off the names of all Green Guards when they reach 16 years of age, chopping off all those who move or change addresses. Even with this gentle treading on our part the kids of Oregon continue to seek out Green Guard membership. Through September of this year we received 6,252 applications at Salem headquarters. We have approximately 30,000 Green Guards on our rolls today.

Many thousands of kids still consider themselves Green Guards, even though we no longer carry them on our rolls. Our fire suppression crews each summer are made up largely of those who got their first taste of forest protection and first interest in the forests from their Green Guard membership. Many Green Guards have enrolled in forestry schools.

The Green Guards defy the laws of organizational gravity. Successful youth organizations are supposed to have adult leaders. The Green Guards supply their own leadership. The remarkable feature of this youth movement is the never-ending flow of new ideas, new plans, and enthusiasm from the members, all spontaneous, which pour into state headquarters. Mention Green Guards to an experienced educator and his eyes will glow. Ask him why this unorthodox, home-talent, loosely supervised phenomenon of youth is such a howling success, and he shakes his head in mystification.

I think I have the answer. For once the kids have been put completely on their own. They have been left to their own devices. They have been given the problem —protect our forests from fire. The amazing response to this individual enterprise system has paid off with remarkable results.

During 1949, 48 boys and girls reported forest fires, put out small roadside fires, or have qualified for our top award, a Service Under Fire certificate, given only after submission by the Green Guard of a complete report of his service under fire, certified to by an adult.

Half the letters which arrive by the hundreds every month ask for more things to do. Through the medium of this activity, even though loosely supervised, kids have learned the rudiments of care with fire. Their manuals tell them, in interesting style, of jobs they can do around the home, around the farm, and when they are in the woods. They have become crusaders and their alert eyes never miss a danger spot. County committees feature them at service club luncheons. Award winners are presented over their local radio stations. Schools honor them when they win prizes in essay and poster competition. Some county chairmen father them in their home counties. Boy Scout leaders and 4-H club leaders give them a hand, but mostly they are on their own.

A boy or girl who can enlist five Green Guards becomes a captain and is entitled to wear the double bars of a captain on his or her specially made arm-band. These self-named or elected captains are the only actual leaders in the field.

The far-reaching impact of this astounding organization on the youth of Oregon is solidly felt. Every boy and girl considers it an honor to belong to the Green Guards. Although only seven years old, the record of achievement of this kid-ruled, out-sized club has already reached tremendous proportions.

By running their own show these boys and girls are learning how to get along with a complex society. In some, the natural traits of leadership are showing up early. Much credit for the increased fire consciousness of our oldsters goes back to the tireless pounding of these young zealots.

The thrilling stories of performance under fire by these Green Guard youngsters deserve national recognition. The story of 11-year-old Patricia Barnes, whose courage prevented a vast forest fire, is one of my classic and best-loved tales of these self-starting kids. Some cigarette flipper, late one summer night, had tossed a lighted fag into dry roadside grass next to a green young forest. Pat's grandfather tried to corral the fire with a shovel, but it was soon apparent he would need more force. Pat ran home a quarter mile, loaded a stone sled with five-gallon tins of water, climbed on a small tractor, which she had never run before, backed it around, hooked on to the stone sled and took off over ditches, roads, and fields to the fire with grandmother precariously astride the stone sled. The three of them working with wet gunny sacks finally cornered the fire, but it was long after midnight.

Somehow the picture of Patricia Barnes, starting and driving her first tractor under pressure of necessity, epitomizes the Green Guards. No adults urge these youngsters to do a job. They make up their own rules of behavior, fit them to the immediate situation. They develop civic consciousness early in life and self-reliance strictly of their own invention. There are hundreds of stories of the exploits of these kids.

Results Obtained

Now, what about results? I have described the widespread use of publicity to fight forest fires and how we have developed Keep Oregon Green and Keep Washington Green as leading public service activities in our two states. Have these intensive efforts paid off? Let the record speak for itself.

In the ten years from 1930 to 1939, prior to the organization of Keep Oregon Green, 1300 man-caused forest fires occurred on state and private forest lands. This terrible destruction of our basic resource had been going on unabated since the first settlers arrived in the 1840's and started burning off the forests to make way for crop lands.

In Washington, forests were being burned just as recklessly,

just as needlessly by an indifferent populace who saw no particular reason for being careful with forest fires. Forest fires had been a part of the Oregon and Washington scene since the earliest days of settlement.

During the first three years of Keep Oregon Green—1941, 1942, and 1943—there was an unbelievable reduction in man-caused forest fires in Oregon. From the total of 1300 each year during the 1930's, we dropped to an average for the first three years of KOG of 447 on state and private lands. This was a reduction in number of fires of 57 percent. During 1944-1946 we averaged 591 fires a year, a drop of 43 percent. In six years we had cut the number of fires by more than one-half.

The year 1947 was equally impressive with 422 man-caused blazes reported. In 1948 we had by far our best year with only 352 man-caused fires. Many foresters have pointed to weather conditions during the 1940's as one of the reasons for the great drop in forest fires. Perhaps they are right, but the fact remains that similar weather conditions have existed since the turn of the century when fire records were kept and no such reduction in man-caused forest blazes has been reported in the past.

What happened to acreage destroyed in those years? In the 1930's we annually burned up 125,000 acres in our state. A forest fire that did not burn at least 1000 acres was not much of a blaze, hardly made the newspapers. Starting with 1941, the acreage destroyed dropped even more astoundingly than the number of fires. We of KOG take no credit for this phenomenon, except to point out that by alerting the general public, we have had more cooperation in reporting forest fires while they were still small. Detection and suppression facilities have been greatly improved and organized fire fighting has been greatly stepped up and coordinated in these past ten years.

But here is the record. During the first eight years of KOG the average fire loss on state and private lands has been held to approximately 7,500 acres per year. During 1948 we had the all-time record year of only 2,612 acres burned.

Now comes 1949 and the worst fire year in thirty years from the standpoint of risk, exposure, long periods of rainless days with fuel moisture content powder dry all summer. Foresters agreed that this would be the test year. If results built up the past nine years held through 1949, they were willing to concede that KOG had had some influence on this remarkable drop in man-caused fires.

We will end the current season with about 700 man-caused fires on state and private forest lands, and the acreage burned will be somewhere in the neighborhood of 20,000 acres.

We believe the 1949 record is proof of the effectiveness of KOG. Even in the face of one of the worst potential fire years in three decades, the number of man-caused blazes is still only half of what it was during the 1930's. Consider also that logging has stepped up in volume over what it was ten years ago; that dangerous slash areas have been greatly expanded during the war and postwar years; that travel in the forests has increased four-fold with the influx into our state of more than 500,000 new citizens since 1940. All these handicaps confronted us as we developed and hammered along our central theme of preventing forest fires.

We will leave it for the record whether or not our $20,000 annual budget has not been the biggest money ever spent in Oregon. With this $20,000 investment, we have saved an estimated $2,500,000 worth of forest values each year, which were being burned up in the 1930's.

This, then, is the story of Keep Oregon Green, its origin, its growth, and its accomplishments.

A Potential Market for Forest Plantation Thinnings

H. L. Henderson

Associate professor of forest utilization, New York State College of Forestry, Syracuse.

LOG CABINS bring to mind the pioneer days of our country; a time when life was rugged and people had only the barest of necessities. It was natural then to use logs for houses, inns, barns, and other buildings because sawmills were unknown or were crude water-driven affairs.

The wilderness that confronted the early settlers was a ready source of building materials in the form of young trees, cylindrical in form, that needed only to be chopped down, notched, and formed into buildings. Shakes or shingles could easily be rived to cover roofs which were laid on small logs for rafters. Moss or clay was stuffed into spaces between logs to make a tight wall, thus making a warm abode for the pioneer and his family.

In those days lumber could only be made in a slow, laborious manner by use of whip saws or pit saws. By the use of jack planes, the boards could be smoothed to use in cabinets, shelves, beds, and other articles or furniture. So the pioneer carved himself a home out of the wilderness and helped to build a nation.

We often think the virgin woods were composed of large, mature trees but not all trees were large or mature. There were always small and immature trees scattered or in a group or in areas contiguous to a heavy stand of old trees. One can find plenty of areas of small trees now scattered in the virgin stands of our western fir and redwood forests.

Sawn lumber has been so commonplace in our economy for so many years that we think of a log house as either very old or very "backwoodsey." As a summer cottage or vacation house, the log building has slowly come back to compete with lumber. It has never been quite so popular as lumber due perhaps to the cost which is usually higher, the scarcity of available logs of the right sizes and species, and the lack of skilled labor.

Many people like the appearance of logs in a cottage on a lake shore and it seems to fit into the outdoor scheme of things that is expected on a vacation. To satisfy this demand some planing mills have taken 2″ boards, run them through a molder, cutting one side rounded to resemble a log. The other sides were either tongue and grooved or ship-lapped. This material comes on the market as log cabin siding and is applied to the framing similar to regular siding. Any carpenter then can apply it and the result is a cabin that looks almost like a solid log cabin and the cost is appreciably less. Such construction is warmer and more substantial than the usual cottage built with cove siding on framing.

Reforestation in America got its slow start about forty odd years ago. Patterned after European forestry, extensive areas in our northern and eastern states were planted with white pine, red pine, Scotch pine, and spruce. A lot of faith and plenty of hope went into these plantations. While we followed the old world technique of planting, we have an entirely different economy. There were plenty of uses for the thinnings that must be removed from a plantation in the old world and yet a forest seldom could be made to pay unless interest on money was under 3 percent. In our country, with interest rates much higher and no market for the first two or three thinnings, it has been extremely difficult to make a forest plantation pay its way.

In more recent times, some markets were found for early thinnings especially where there were pulp mills nearby to take spruce or pine pulpwood. A few wood-using industries can utilize small logs from plantations but it leaves the majority of these plantations still without a profitable market for the thinnings that must be taken out at 20, 30, or 40 years of age.

Yield from a Thinning

It was the thought of this writer that some profitable material could be made from forest thinnings. When a 32-year old stand of Norway spruce was thinned by the New York State College of Forestry the tops were sold for Christmas greens. The poles that were left might have been suitable for pulpwood if a pulp mill had been available. In this experiment a small quantity of the trees were cut into 9-foot logs and taken to the college sawmill. The small ends measured from $5\frac{1}{2}$″ to 7″ in diameter inside the bark. The logs were set up on the head blocks with the bark side parallel with the saw. The first cut was very thin, hardly deeper than the bark. This flat side was then placed down on the head block to keep the log from rolling or twisting during cutting. The next cut was made $2\frac{1}{4}$″ deep and parallel with the bark. A piece of log cabin siding came off. The cant was then turned 180° and another 2″ piece of siding, also cut parallel with the bark, resulted. What remained was a wedge shaped timber with bark on one edge. This last piece was adjusted on the head blocks so as to square it up and yield a 2x4, or 2x5, or a one-inch board about 5″ wide. The refuse was a wedge-shaped board from the center of the log.

A study was made of the yield from 25 butt logs, measuring $5\frac{1}{2}$″ to $6\frac{1}{2}$″ d.i.b. at small end and 9 feet long, which would have yielded 50 cu. ft. or about $\frac{1}{2}$ cord if utilized as pulpwood. Instead, they were cut into long cabin siding thus producing 282 bd. ft. of 2″ long cabin siding and 78 bd. ft. of lumber ranging from $\frac{3}{4}$″ to 8/4″ thick. In every case a log yielded at least two pieces of siding 4 to 5 inches wide and in most cases a usable board came out of the center. The log siding was peeled and allowed to air season.

Then the siding was taken to the woodworking shop where the first operation was to smooth the flat side. By setting the jointer for a heavy cut, the pieces were

passed by hand once or twice to square the face and make a smooth surface. Many of the pieces had bowed some in seasoning but were easily cleaned up by the jointer.

Next they were run through a straight cutting rip saw to get one straight edge to work from. A dado head was placed on the table saw. This is a combination of two special saws with cutter heads between making a wide kerf (1¾″).

Two passages through this dado saw cut a shiplap; i.e., a tongue on one side and a lap or groove on the other. Due to the weight and length of the pieces, it required two men to conduct this operation.

The lumber that had been made from the center of the logs was sized in the surfacer to merchantable pieces.

Construction Suggestions

In order to determine how this siding would appear after construction, a small corner of a building was erected using horizintal 2x4's for framing to nail to (Fig. 1). This side wall was made 8 feet high and the siding placed vertically in contrast to the old log cabins where the logs were ususally placed horizontally. The taper on the small trees would not allow the use of long logs without great loss of material.

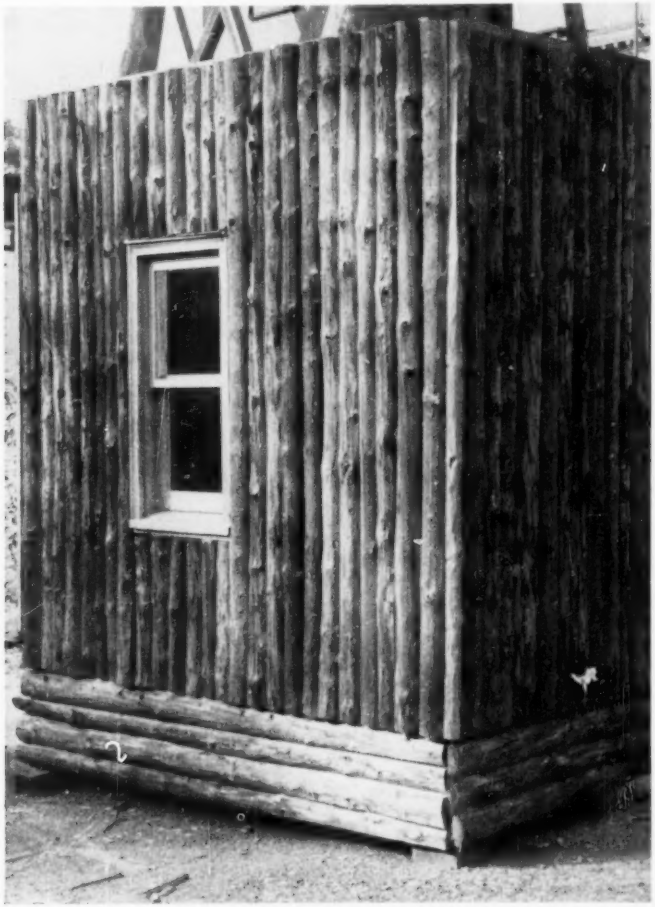

Photo by C. Wesley Brewster

Fig. 1.—Exterior view of corner of a sample cabin showing appearance of siding made from thinnings from a 32-year old Norway spruce plantation.

The cabin showed a smooth interior wall (Fig. 2) that would need no other panelling for summer time use. It was weather and insect tight and the outside gave the rustic appearance desired.

The machines used to make this siding were a sawmill, a 16″ face planer or jointer, a rip saw and a table saw equipped with a dado head. Practically every small planing mill would have these machines.

Large mills might have a molder or sticker machine which would plane one side and cut the tongue and groove or shiplap, all in one passage through the machine. It might be better in such cases not to put on a top head as it might destroy some of the rustic effect produced by the uneven knots.

This experiment was made only on spruce thinnings but there is good reason to believe that pine thinnings from 25 to 30 years of age would make similar log cabin siding. Older trees and butt logs will make wider pieces of siding and also yield some boards and 2x4's and 2x6's, all of which can be used in the framing. The top logs would yield one or two pieces of siding or they can be made into 4x4's or 2x4's. The log siding should be about 2″ to 2¼″ thick when cut because they will shrink in seasoning and lose some in surfacing leaving them from 1 7/8″ to 2″ thick when finished.

The tongue should be ½″ thick by about 7/8″ wide while the groove or lap is made ½″ x ½″ wide.

It is seldom feasible to leave bark on log cabins for it peels off irregularly under the weathering and soon becomes unsightly. Trees for this purpose should be cut in the spring or early summer and the bark peeled at once. The logs should be taken to the mill in long lengths and then cut to the lengths desired just prior to going through the mill.

Three to four months of air seasoning during the months of April to October will bring the moisture content of the slab siding down to 15 to 18 percent which is sufficiently low to manufacture the rest of the way.

Logs will not season well as such

checks and none that will impair their value.

Sap stain preventives should be used if the peeling is done during the warm period of June or July. Dipping in one of the several commercial solutions, such as Lignasan or Dowacide, will prevent blue stain while seasoning.

Slab siding will warp some during seasoning. It bends away from the heart usually. It is not difficult to surface one side on the jointer even if there is a bow as pressure is applied on the front table side instead of on the rear table. Boards with bend are not objectionable as they can be sprung into position at the time of nailing onto the framework of the house.

Log cabin siding piled for air seasoning should be supported by three or four stickers of even thickness. A board roof of low grade lumber should be placed over the pile to keep the sun and rain from but will tend to split or crack while siding will dry with few small the upper layers so that seasoning will be speeded up, staining will be minimized, and checking slowed or eliminated entirely.

After log cabin siding is manufactured it should be trimmed to 8-foot lengths or whatever length the local market uses. A small amount of short pieces 4 feet or 6 feet long can usually be utilized in building summer cabins. Around windows and doors and in the gables, shorts can be used in various patterns to produce varied and pleasing effects.

A plate of 2x4's at the upper part of the house frame is used to furnish a sturdy frame for nailing. A 2x6 nailed on top of the plate at the bottom of the gable causes the short pieces in the gable to overhang the lower siding to permit rain to run off.

Some 4/4" stock is needed for framing around doors and windows, for roof boards and partition lumber. Two by fours and 4x4's are needed for studding and rafters, and 2x6's or 2x8's are essential for floor joists. All this material can be obtained from thinnings taken from plantations of pine or spruce of from 25 to 40 years of age. Where 2x10's or 2x12's are indicated for construction, such as floor joists, they can be secured from the regular yard supplies available anywhere. It is likely that 2x4's and 2x6's or 4x4's cut from small trees will have wane on some corners. This is not usually detrimental if the bark is removed.

The vertical wall of a cottage built of log cabin siding is smooth except for the framing, and shows many knots which are not at all displeasing in a summer home. It is also easy to apply wall board on the inside if the cottage is to be occupied during the spring or fall months to give added warmth.

Another way of making log siding is popular in northern Michigan. Small cedar and balsam, selected for size, are removed from swampy areas, bark peeled, and the logs sawn through the middle. Logs run from 5 to 7 inches in diameter at the small end. After seasoning, the log slabs are surfaced one side and a groove is cut in both edges. A small wooden spline is used in construction and the siding is applied vertically being toe nailed at the floor and a 2x4 spiked at the top. This makes a smooth interior wall from floor to roof plate.

Although many such log buildings are painted white, a pleasing color, most of those observed in Michigan are coated with a clear exterior varnish which gives a light, yellowish appearance, quite durable. The log cabins seem to stand out prominently along-side

Fig. 2.—Interior view of spruce log siding illustrating the effects of shiplap construction and knotty appearance. Framing affords substantial structural strength and permits easy application of insulating boards when found to be desired.

the old board cottages most of which were of poor architectural design and in many cases left to run down and deteriorate.

Summer cottages built with log siding are only one of the uses of these log slabs. Many attractive restaurants, garages, eating stands, and the like were observed in Michigan and they were found in the cities and small villages as well as on the lake shores. Many farm buildings, sheds and coops could be constructed with these slab sidings to advantage for the price should be lower than buying regular lumber for construction.

Here then is a marketable outlet for forest plantation thinnings that should yield a good profit for a forest in its younger years. It should reduce the capital investment early and help make a forest a paying investment.

The Work of the Forest-Soils Committee of the Douglas-Fir Region[1]

T. B. Plair
Chief, Regional Forestry Division, Soil Conservation Service, Portland, Ore.

SOIL IS more important to the forest manager than any other single factor in the ecological complex that results in producing a timber crop. He can build soil or he can destroy it. He can cauterize and thereby kill the millions of living organisms that keeps each acre of forest land productive. He can lay it bare, and subject it to damage or even total destruction by water, wind, and sun. He can add organic matter which keeps the soil healthy and makes it a better reservoir for water and a better home for trees.

Two years ago more than fifty technicians attended a meeting in Portland, Ore., to exchange ideas about forest-soils problems. This was the product of an earlier meeting of a smaller group who got together to find out what we knew about the subject. We soon decided that there must be others who knew more about it than we did. So we issued a call, and they came from Oregon, Washington, Idaho, and California.

At this meeting, many problems were discussed and a listing was made of those considered most important. The group thought that continuity of interest should be provided by a committee consisting of Gordon Marckworth, W. D. Haggenstein, and Clarence Richen.

Shortly thereafter, the Forest-Soils Committee of the Douglas-fir Region was appointed. Its membership consists of the following personnel:

Karl Baur, Western Washington Agricultural Experiment Station, Puyallup, Wash.

Vincent Bousquet, Weyerhaeuser Timber Company, Vail, Wash.

Stanley P. Gessel, College of Forestry, University of Washington, Seattle, Wash.

Leo A. Isaac, Pacific Northwest Forest and Range Experiment Station, Portland, Ore.

George Schroeder, Crown Zellerbach Corporation, Portland, Ore.

R. F. Tarrant, Pacific Northwest Forest and Range Experiment Station, Portland, Ore.

R. H. Spilsbury, British Columbia Forest Service, Vancouver, B. C.

L. C. Wheeting, Washington State College, Pullman, Wash.

T. B. Plair, chairman, Soil Conservation Service, Portland, Ore.

The first meeting of this committee was held in January 1948. Since then we have held three additional meetings, including two in the field. On one occasion we met at the University of Washington's Pack Forest and spent a day in the timber on lands of the Weyerhaeuser Timber Company. The other field meeting was held in Lewis County, Washington, to observe some of the areas considered by Hill, Arnst, and Bond in their work on a method of correlating soils with Douglas-fir site quality.[2] Following that, we spent a day on Weyerhaeuser's Vail Tree Farm and on the Voight Creek Experimental Forest of the Pacific Northwest Forest and Range Experiment Station.

During these meetings, many forest soils problems and means of getting some work done on them were discussed. A list of those problems was prepared and circulated to foresters and soils scientists in the Douglas-fir region. We asked for their comments and suggestions of studies which might help solve some of the problems.

Major Problems

The principal problems listed were as follows:

Forest management.

1. Effects of different degrees of thinning on soil moisture and soil fertility.

2. Effects of leaving varying amounts of slash following clear-cutting on the germination and survival of Douglas-fir.

3. Effects of fire on forest-soils as to pH, nitrogen and organic matter relationships, the mineral status, erosion, leaching, and rates of growth.

Productivity ratings or site classifications of forest-soils.

1. A soil classification for forest lands of the Douglas-fir region.

2. Relationship between site classification and soil properties for various tree species.

3. A soil productivity classification for the growth of trees.

4. Use of plant indicators in determining site quality and their relationship to specific soil properties.

5. Soil requirements and site quality of trees supplying minor forest products.

6. The relationship between site quality, soil fertility, and the quality of the wood of forest trees.

7. The available water in certain forest soils in relation to site quality and forest growth.

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2]Hill, W. W., Albert Arnst, and R. M. Bond. Method of correlating soils with Douglas-fir site quality. Jour. Forestry 46(11). 1948.

8. An evaluation of soil properties that determine whether land is best suited for grass or wood production.

9. A practical site classification for logged and burned land.

Influence of soils on forest tree physiology, anatomy, and nutrition.

1. A study of the mineral nutrition and nitrogen requirements of specific trees of this region.

2. Soil requirements for germination, establishment, and initial growth of various tree species.

3. Studies of roots, their anatomy, structure, and habits.

4. Mycorrhizia in forest soils of this region and their relation to the growth of the major species.

5. The influence of soil fertility and moisture levels on mineral absorption and growth of forest trees.

6. The water requirements of northwest trees.

7. Studies on the reproductive capacity of many species of trees and other competing vegetation in the Douglas-fir region.

Other problems dealing with the physical, chemical, biological, and morphological properties of forest-soils were considered. Forest-tree nursery soils came in for their share of attention.

We think we have catalogued most of the major problems, and several of the minor ones from the viewpoint of applied forest-soils management. There was no attempt in the final grouping of these problems to establish priorities. We realize that we are depending on many other people to do the work of supplying answers. Therefore, we want them to work on those problems or phases of problems in which they are interested and for which they have the time and facilities.

A bibliography was prepared on all reported research work on the effects of fire on forest-soils.

Another project has been the development of a classification system of forest soils. The initial draft of this proposed classification system has been completed.

Our most recent job is an exhibit of forest-soil monoliths with interpretations of their relationships to the growth of Douglas-fir.

These things have been done by our committee. Perhaps individual members should get recognition for their contributions, but we of the committee are not seeking that. We want others to know more about our forest-soils and we want them to find answers to some of the problems, and get the credit for their additions to the art and science of forest-soil management.

Other activities have been started in the field of forest-soils in the Douglas-fir region.

1. The Bureau of Plant Industry, Soils and Agricultural Engineering has plans for surveying the rough mountainous lands or forested lands of a western Washington county, using the forest-soils classifications developed by the committee.

2. The Crown-Zellerbach Corporation and the Weyerhaeuser Timber Company have started collecting forest-soils data on their tree farms.

This information will be used in the development of forest land management programs in the same manner as other pertinent physical data are used.

3. The Soil Conservation Service is now recording certain physical characteristics of forest-soils which enables us to make a forest land capability classification. This information permits interpretations of the possibilities of continuous productive forest land management; that is, the management of both trees and soils.

4. Oregon State College is starting land-use studies on range and forest lands, in which it plans to consider forest-soils. Our committee has been requested to assist in the development of the program.

5. Another very significant job in the field of forest-soils is now being done by the California Forest and Range Experiment Station in cooperation with the California State Division of Forestry. This work includes soil mapping and evaluation of millions of acres of California's forest lands.

6. The Pacific Northwest Forest and Range Experiment Station has been actively engaged in forest-soils research.

7. The University of Washington College of Forestry has been largely responsible for the accomplishment of the committee. A member of the forestry staff, Stanley Gessel, worked with the Soil Conservation Service during the past summer in developing correlations between forest-soils and tree growth for use as planning tools by the Service.

Summary

The primary objectives of this committee are to:

1. Promote thought and discussion of forest-soils.

2. Suggest problems for study to research workers and others in a position to work on them.

3. Serve as a focal point for the collection and dissemination of information about forest-soils. The Western Forestry and Conservation Association has offered to publish reports of work done by or sponsored by the committee.

We invite comments on our forest-soils problems. Suggestions may be sent to any member of the committee, or to either the Puget Sound or Columbia River Sections of the Society of American Foresters, co-sponsors of the Forest-Soils Committee of the Douglas-fir region.

A Look at Selective Cutting in Douglas-Fir[1]

Thornton T. Munger

Formerly director, Pacific Northwest Forest Experiment Station, Portland, Ore.

DURING THE past fifteen years foresters of the Douglas-fir region have made a silvicultural detour in their cutting practices in the virgin forests of western Washington and Oregon. They departed from the time-honored path of clearcutting and explored the labyrinth of partial cutting, and now are back again at practically their point of departure. This experience in the testing of a new method is an interesting item of history that is worth recording. And it has lessons for foresters whose business is to practice sound silviculture.

Until the early 1930's clearcutting was the universal practice in the Douglas-fir region; on public lands, with the reservation of single seed trees or blocks of seed trees; on private lands, usually without conscious provision for regeneration. No one questioned the silvical desirability of clearcutting with this intolerant species that normally occurred in even-aged stands, although the condition of much logged land was shocking, the result of insufficient seed supply and inadequate fire control. Moreover the universal method of logging with donkey engine and high lead made clearcutting practically compulsory.

About 1931 the crawler tractor, then much used in the pine region, was improved to such a point that it was given a trial in the Douglas-fir region. A logging engineering study by Axel Brandstrom, then of the Pacific Northwest Forest Experiment Station, the results of which were published by the Charles Lathrop Pack Forestry Foundation in 1933 (*1*), proved the economic superiority of the tractor over the donkey engine under many conditions. The tractor was hailed by loggers as their salvation in operating certain shows. It saved expensive railroad spurs, rigging of spar trees and other fixed per-acre charges, so that the logger could afford to take a light cut of the better growth and leave the trees that showed a negative conversion value. Thus there developed on private lands a form of partial cutting which was popularly called selective logging, or selection cutting, but should more properly be referred to as zero-margin tree selection or logger's selection. It was purely a taking of the highest value trees, sometimes with the expectation of coming back for the rest at a later date, sometimes without such a plan. The disposal of slash under such partial cutting was a headache for all concerned.

Prompted by the mechanical feasibility of partial cutting using tractors, and the financial advantages of this method, Brandstrom continued his studies of the economies of partial cutting and was joined by Burt Kirkland in an original and thought-provoking thesis, also published by the Pack Foundation, entitled *Selective Timber Management in the Douglas Fir Region* (*2*). This publication made a great impression locally in the profession because it was so revolutionary and because it held out such high hopes to an industry, then operating more in the red than in the black, that its salvation lay in selectivity. Though this original and imaginative thesis dealt primarily with organizing a property for selective timber management, this implied in most cases individual tree selection cutting at frequent intervals. With the silvicultural aspects of Kirkland and Brandstrom's thesis many foresters, both in and out of the Forest Service, disagreed at the time.

Everyone is cognizant of the basic advantages of partial cutting and is all for it wherever it may be applied. For example, at the Fifth Pacific Science Congress in 1933 I described twelve financial and silvical points of advantage of selective cutting, yet recognizing its inapplicability to certain types (*3*). At lumbering and forestry gatherings there was much discussion of the role of partial cutting, and usually much confusion between the zero-margin cutting some loggers were practicing and the light tree selection which some foresters were advocating. After one or two trials of this light selection cutting had been made the then regional forester sent a circular to the forest supervisors which said in part "It is considered that clearcutting practices on national forest lands should be abandoned if possible and systems of selective logging devised and substituted."

In the succeeding years more and more of the timber sales on the national forests stipulated a tree selection cut in which usually not over 35 percent by volume was to be designated for logging. Mechanically it was found entirely practicable to take out selected trees, except on steep slopes, even in these dense stands of giants, and leave the rest more or less undamaged. A forest canopy was left after logging, forest capital was standing, the forest looked green. Did we still have our cake, after we had eaten it, or did we only have crumbs that would spoil? Opinion of foresters on the ground varied, but they loyally and skillfully tried out the method that had been prescribed.

Among lumbermen there was also difference of opinion. Some ridiculed it, others thought it gave them the best, or only way, of getting to their mills the species and quality of logs they wanted, without having to handle the mass of low grade material that clearcutting involved. Foresters were well aware of the dangers of high-grading, well expressed by the German maxim, which F. S. Baker used in his silviculture textbook, "*Der plenterwald muss nicht ein plunderwald werden.*" (The selection forest must not become a plunder forest.) Yet in an old decadent forest where even the best species are of relatively low value, it is difficult to mark a cut that anyone will buy without including the better species and a good share of the better specimens, leaving the culls and the small trees, always with the hope that they will enjoy a

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949.

good volume and price increment before the next cut.

The O. & C. Administration, now in the Bureau of Land Management, U. S. Department of the Interior, simultaneously employed tree selection cutting, in some cases by a diameter limit, on some of its sales.

Results of Research

When Lyle Watts became regional forester in 1939 the controversy continued on the question whether partial cutting in old growth of the Douglas-fir region was really good or only looked good. The virgin forests of this region are so variable that the problem was exceedingly complex, especially when viewed from its many angles. The practice of partial cutting on national forest timber sales was continued, but Watts made it plain that the ultimate success of the practice was unproven and every case should be considered an experiment.

At the outset of this innovation the forest experiment station started to watch the results in various mature timber types with studies of logging damage and decay, windfall and other mortality, growth, silvical requirements, and fire hazard. The experiment station, of which I was then director, was in a difficult position, for those on its staff who were silvically minded were suspicious of partial cutting in typical old-growth Douglas-fir, while the economists thought it the great hope of profitable forestry. The station tried to take a scientific and non-committal view until results of its experiments should be available. However, in 1939, using observations and indications then available, I read a paper at a meeting of the Society of American Foresters (*4*) in which I warned against trying to grow Douglas-fir in an uneven aged stand, against expecting more growth under partial cutting than clearcutting, against creating a slash fire hazard that cannot be abated on perhaps three times the area that clearcutting would involve, against the danger of windfall, the increase in insect activity, logging damage to the reserved trees, and the undesirable exposing of old trees.

Soon thereafter results of the experiment station's studies and the observations of forest officers proved that the fears of many of us were well founded, and the claimed and hoped-for advantages of partial cutting were more than offset by its undesirable consequences. Windfall was exceedingly heavy on several areas, even after a 30 percent cut, so heavy that some areas were subsequently clearcut in salvage. There was mortality of standing trees from root and crown exposure and scarring. Insects attracted by the slash and the sunlight raised havoc in some instances. Scarring of the boles of the thin-barked tolerant hemlock and spruce, which often comprised much of the reserve stand, was very severe. In comprehensive studies of decay from logging scars Ernest Wright and others of the Office of Forest Pathology, working with Leo Isaac of the experiment station, found rapid spread of rot from both top and basal injuries, sometimes rendering reserved hemlocks worthless in a few years (*5, 6*). In defective Douglas-fir, such as is prevalent on the Oregon Cascades, it was found that perforce any economically feasible partial cut increased the proportion of cull and low-grade trees, and the Forest Service soon discontinued partial cutting under such conditions.

Of greatest significance was the failure of many of these partially cut areas to make any net growth. When the experiment station's permanent plots had their 5-year measurement this was indicated, but little was said until there was a 10-year record. That is now available, and Isaac will soon issue a manuscript which will show that on a large number of acres of tagged trees on six areas the net loss in volume for the 10-year period has averaged 1,500 board feet per acre per year. This is the damning evidence against partial cutting in virgin stands of western Washington and Oregon. As Walter Lund, present regional chief of timber management, says, "We have found that partial cutting depletes the forest capital without providing replacement."

So in the Report of the chief of the Forest Service for 1947 the curtain was drawn down in these words, "Obviously, partial logging in Douglas-fir as practiced to date has failed to accomplish the objective of converting static forests to growing forests. A better method seems to be clearcutting in strips or patches with provision for natural seeding-in from uncut stands bordering the clearcut areas."

Clearcutting Practiced

So in practically all the new sales in the national forests, except in the mixed, uneven-aged stands of southwestern Oregon, and in certain other thrifty mature stands, clearcutting is employed again as of old, only the clearcut areas are kept small so that seeding from the side is assured and the slash fires may be controlled. The Bureau of Land Management now also considers clearcutting the standard. Only one private operator is now practicing tree selection cutting in old growth as a silvicultural measure, so far as I know. Others occasionally practice installment cutting to get out a special product in advance of the main harvest, or to salvage snags or old trees in a two-storied forest, when the terrain allows the use of tractors. However, there is considerable zero-margin tree selection, which often leaves quite a cover of low-grade material, and under the present depressed market there is likely to be more.

Bear in mind that the so-called virgin forests of the Douglas-fir region are exceedingly variable in species, stand structure, age, density, and topography. It is dangerous to generalize in speaking of them so briefly as I have here. I cannot take time to recite the rare combination of cover conditions and topography that make partial cutting acceptable all around. Installment cutting, where the lapse is relatively brief between the preharvest cut and the final clearcutting, often has immediate financial advantages. Intermediate harvest cuts in thrifty mature stands seem to have some promise. Thinning in immature stands is an entirely different mat-

ter, a practice which everyone endorses.

This in brief is a chapter in the history of cutting practices in the Douglas-fir region. For a few years foresters strayed rather far afield in disregard of nature's biological principles. As an experiment it has been valuable. Without experimentation there would be no progress. But in this case a revolutionary practice was adopted wholesale before the results of experimentation were available.

This chapter of silvicultural history has a moral for the profession, especially since it is only one of three instances I might cite when foresters in this region plunged headlong into some new practice, impelled by the claims of its promoters, before making scientific appraisal of all aspects of the new proposal. Silviculture is an art that should base its practices on the proven findings of many sciences. It must be practiced consistently over a long term of years. It should not be swayed by considerations of passing expediency or popular appeal. Let foresters keep to their science of silvics. And let us keep research ahead of practice, so that untested innovations will not get ahead and get off the trail of nature's silvical laws.

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Bark-Chipped, Acid-Treated Turpentine Butts Found Suitable for Pulpwood

The "catfaces" or butt sections obtained from bark-chipped, acid-treated trees are suitable for pulping by the sulfate process, according to the results of a cooperative study by the National Container Corporation and the Lake City (Florida) branch of the Southeastern Forest Experiment Station. Yields of pulp from the new-type catfaces were almost equal to those from round pulpwood. No modification of the cooking process was required, and the use of sulfuric acid to stimulate the flow of gum was not detrimental to the pulp.

These conclusions were stated in a report by R. H. Stevens, technical director of the National Container Corporation, where the pulping tests were made.

The bark-chipped butts used in the test were harvested from the Olustee Experimental Forest by George F. Gruschow of the Southeastern Forest Experiment Station. The trees had been chipped and treated with sulfuric acid every two weeks for a period of four years. Two faces were placed on selected trees larger than 10 inches in diameter to provide a good gum yield before a scheduled harvest cut.

Catfaces from these trees gave an average net pulp yield of 41.2 percent of the weight of moisture-free wood, in two runs in a small digester. Corresponding yields from mill-run catfaces and from regular pulpwood were 36.5 percent and 42.0 percent respectively.

Conclusions from the test of bark-chipped butts apply to restricted periods of turpentining in advance of timber harvesting. The bark chipping method of turpentining was developed at the Lake City branch station only a few years ago, and trees with two successive bark-chipped faces are not yet available for testing.

Early Results of Bud-Pruning in Slash Pine

Charles A. Rowland, Jr.

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The shortage of high quality logs has caused increased attention to pruning as a means of growing quality products on short rotations. The principle of producing knot-free timber by periodic removal of lateral buds from young trees has been applied to certain northern species. This article describes a southern experiment in the bud-pruning of slash pine, a rapid-growth tree that seems well suited to pruning for increased quality.

THE IDEA of producing knot-free lumber has intrigued foresters for many years. Various methods of artificial pruning to improve quality have been used since late in the 18th century, and pruning has become an established silvicultural practice. The generally accepted pruning practice is the removal of live and dead limbs from the lower portion of the tree trunk to a height of 17 feet, in one or more operations, leaving the upper portion of the crown to support growth.

During the past decade, a new method of tree pruning, known variously as bud-pruning, debudding, finger-budding, and Russian pruning, has aroused considerable interest among foresters. The principle of this method is the annual removal from small trees of all lateral buds from around the terminal bud or along the stem, until the trees become approximately 19 feet tall. The limbs on the lower $2\frac{1}{2}$ feet are left during the initial stages of the operation to furnish food for the growing stem. This results in a 16-foot stem free of all lateral branches above a $2\frac{1}{2}$-foot stump. After the desired height has been cleared, the tree is allowed to develop a normal crown.

In 1940, Paul (*4*) reported on the development by Russian foresters of a new method of pruning. Bickerstaff (*1*) in 1945 reported on the work done in Canada in preliminary debudding tests on red pine (*Pinus resinosa* Sol.), white pine (*Pinus strobus* Linn.), and white spruce (*Picea glauca* Voss). In 1946, Paul (*5*) described an experiment by the Forest Products Laboratory on the removal of lateral buds of red pine on the Nicolet National Forest. Also in 1946, Curtis (*2*) described an experiment of pruning forest trees by the finger-budding method in red pine, Scotch pine (*Pinus sylvestris* L.), and white spruce, at the University of Maine.

These writers, whose methods were essentially the same, expressed the feeling that more experimental work is needed for this method of pruning. Their observations were of northern or eastern species. While some bud-pruning has been tried in past years in the South, no reports are available.

In order to determine the effectiveness of bud-pruning when applied to slash pine (*Pinus caribaea* Morelet), a project was set up by the Southern Piedmont Branch, Southeastern Forest Experiment Station, in cooperation with the University of Georgia School of Forestry. In April 1947, W. G. Wahlenberg[1] established four sets of plots in slash pine plantations in Walton and Morgan counties, near Athens, Georgia. Trees from 1-0 stock were spaced 6 by 6 feet. Two of the plantations had been 2 years in the field, or 3 years from seed. The third plantation was a year older.

Methods of Study

The study is a randomized block arrangement of 4 blocks. Each block contains 4 treatments assigned at random to 4 plots in each block as follows:

1. Bud-pruned and thinned to a spacing of 12 by 12 feet.
2. Bud-pruned but not thinned, with the bud-pruned trees spaced 12 by 12 feet and the untreated trees remaining in the plot.
3. Neither bud-pruned nor thinned.
4. Not bud-pruned but thinned to a spacing of 12 by 12 feet.

In each plot, 25 crop trees spaced 12 by 12 feet were tagged with permanent markers, giving a total of 100 trees for each treatment among the four replications. The 12 by 12 spacing results in about 300 trees per acre, approximately the maximum that can be grown to sawlog size.

In bud-pruning, all lateral buds are usually removed during the dormant period by rubbing or snapping them off with the fingers. As the trees become taller, a ladder enables the pruner to reach the terminal bud. In this study the trees selected for pruning varied from 2 to 9 feet in height at the time of pruning but averaged about 5 feet. Since the taller trees had some limbs to be removed, the method of bud-pruning was modified. In addition to removing the buds, all limbs and twigs above $2\frac{1}{2}$ feet were cut off with a pair of small hand clippers, an operation about as fast as breaking off the buds. Since southern pines normally have 2 or 3 growing periods during the year, with the production of lateral branches along the year's terminal growth, it will be necessary to continue a modified form of bud-pruning.

The second season pruning was purposely delayed until after spring growth had started, to facilitate locating the buds in the heavy foliage and to reduce the possibility of leaving damaged terminal buds. It was found that the succulent shoots, 1 to 4 inches long, could be removed with the fingers or with clippers just as quickly as could the buds before growth had started.

At the time of establishment, the total heights, diameters at half height, ground diameters, and needle lengths on the main stem were measured. For trees more than $4\frac{1}{2}$ feet tall, d.b.h. was recorded.

Second Treatment

Heights and diameters were remeasured in April 1948, a full year after plot installation. The second debudding treatment was given the

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pruned plots at the time of re-examination. The second re-examination and third debudding operation were completed in December 1948, two full growing seasons after initial treatment. The technique used in the initial treatment was followed. Limbs which had developed on the terminal shoot were pruned off close to the stem with clippers.

It was found that trees up to 12 feet in total height could be bud-pruned successfully without a ladder (Fig. 1). Trees to 2 inches in diameter were pulled over so that the operator could remove the shoots and twigs with one hand while holding the tree with the other (Fig. 2), obviating the necessity of using a ladder except on the trees which had exceeded 12 feet in height. There was no apparent damage to the trees which were bent. In the April 1948 treatment the tallest trees, which reached a maximum of 15 feet, were pruned with a 6-foot ladder by bending over the leaders to a point at which the shoots could be reached by the operator.

The use of a ladder taller than 6 feet, on uneven ground, is time-consuming and dangerous. Therefore in the December 1948 treatment, since the tallest trees could not be reached from a 6-foot ladder, a pole tree-trimmer was used to prune all trees which could not be reached from the ground. The laterals were removed after they had made several inches' growth and were readily visible. The slight increase in the length of stubs or size of the scars should be negligible. An average of three or four dormant buds was left around the terminal bud on trees pruned with the pole tree-trimmer. This is not bud-pruning in the technical sense, but it follows the technique of periodic removal of lateral growth from the terminal shoot while trees are young.

Results

Any results this early are preliminary and are considered only as indications of what can be expected in the future. Simple comparisons, however, give rather definite indications.

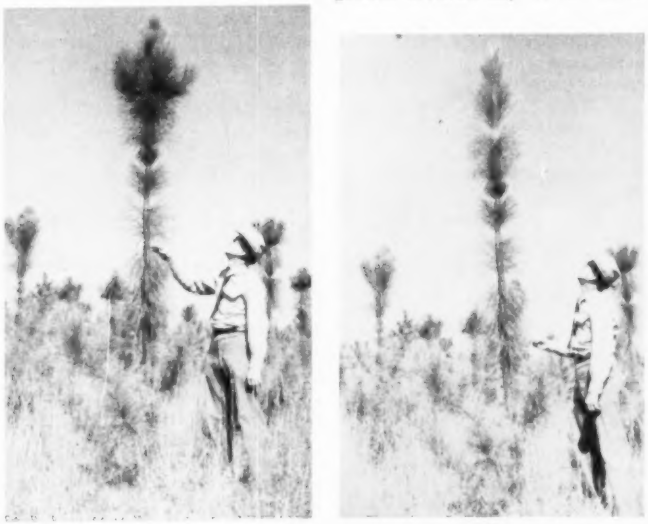
One of the most interesting findings at the time of the first annual re-examination was that there had been no appreciable difference in either diameter growth or height growth between any of the treatments considered. At the end of the second growing season, the effects of pruning were more pronounced. The two-year average diameter growth for the pruned trees was 1.3 inches compared with 1.7 inches for the unpruned. The two-year average height growth for pruned trees was 6 feet, compared with 6.2 for the unpruned.

All scars from buds removed and limbs clipped during the initial pruning had completely healed over in one year. As the branches removed were all less than one inch in diameter, the thin scars resulting from this practice should produce only tiny blemishes close to the pith. It is not likely that the knots will be large enough or abundant enough to degrade the lumber.

The leader damage caused by wind whipping described by Curtis (2) is negligible. Some leaders are bent, probably by wind, but recovery makes the distortions almost unnoticeable by the second year. There has been no mortality on either the pruned or the unpruned plots.

Other investigators have reported that both needle length and needle retention were greater on bud-pruned trees than on untreated trees. These characteristics were not actually measured. It is noticeable on pruned trees that each year's needles are longer than those of the preceding year, (Fig. 1), indicating that during the early years the food-producing capacity of the lower branches is supplemented by the needles on the main stem.

The findings of others, that the branches left on the lower 2½ feet tend to develop at an accelerated rate, were borne out in this study, although somewhat hampered by a heavy growth of broom sedge. This was most noticeable on the plots that contained the smallest trees at the time of pruning, and least pronounced on the plots on which the trees were largest. On the latter, the lower limbs had become partially suppressed and recovery appears to be slow. On these trees there is a distinct tendency for the new limbs, grown after pruning, to develop rapidly. One-year-old limbs were noted with basal diameters of



A B

FIG. 1.—*A*, Typical bud pruned tree at the end of the second growing season after first pruning. Pruner's hand indicates height at time of initial treatment. Note limbs and longer needles produced during current season. *B*, Same tree after limbs and lateral buds have been removed at the end of the 1948 growing season.

one inch and lengths greater than two feet. Many trees developed rather bushy tops between pruning operations (Fig. 1).

In order to determine the cost of bud-pruning southern pines, accurate time-cost records were maintained for all pruning operations. Time-cost is the total elapsed time while in the plot and includes all lost time walking from tree to tree and selecting the tree to be pruned. The number of feet pruned per man minute is the basis upon which the comparisons are made.

The average pruned length for three treatments was found to be 3.37 feet pruned per man minute, elapsed time. It is to be expected that there will be some decrease in length pruned per man minute as the trees grow, but the average for three treatments was only .04 feet less than the average for the first two treatments.

It is believed that the reason this difference was so slight is that pole tree-trimmers were used at the greatest heights instead of ladders. Total pruning costs for southern pines should be less than for northern species, because fewer treatments will be necessary to prune to the desired height. Five or six annual pruning operations should clear a 16-foot log in slash or loblolly pine. A few of the tallest trees have a clear length of 15 feet after three treatments.

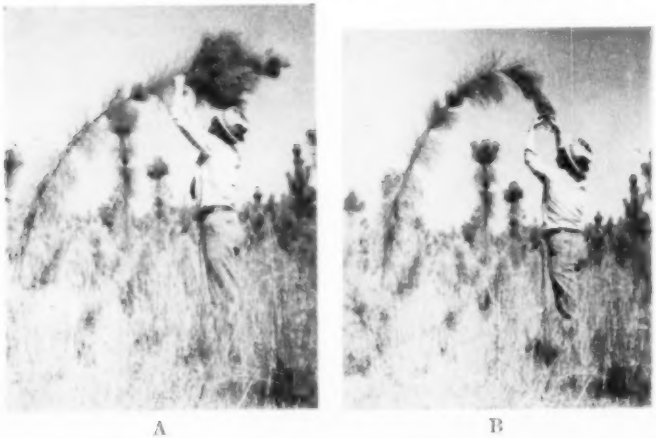
One of the unexpected indications shown by our records to date was that the pruned footage per minute for plots containing the largest trees and the smallest trees, at the time of initial treatment, is less than that for plots containing average-size trees. This indicates that there is an optimum size for initial pruning in slash pine, probably 3 to 6 feet.

Data are being kept on the damage to pruned and unpruned trees done by winter ice storms. Such storms often strike the Southern Piedmont, uprooting or breaking large trees and severely damaging plantations. Three ice storms of moderate severity have already struck the study blocks, and the pruned trees have weathered the storms as well as, and perhaps better than, the unpruned. In theory it would seem that the pruned trees, having less foliage, may be less subject to breakage and tilt. It is too early to be certain.

Fusiform Rust on Trees

Fusiform rust (*Cronartium fusiforme* Hedg. and Hunt) causes excessive damage to slash pine in parts of its range. According to Lamb (*5*) and Siggers (*6*), the infection usually enters through very young limbs and shoots. If so, it is possible that modified bud-pruning might reduce fusiform rust damage by eliminating much of the young lateral branch tissue through which the disease enters.

In this study no excessive damage was noted on the pruned or the unpruned trees from fusiform rust. Some limbs with cankers were found on the unpruned trees and some were found on the lower limbs which were left on pruned trees. Infected limbs on the pruned trees were removed in January 1949, even though below 2½ feet. Most of the stem cankers on both pruned and unpruned trees appear to have resulted from limb and twig infection, which might have been eliminated by early pruning. It seems desirable to remove infected limbs of pruned trees below 2½ feet even at some sacrifice to growth, to prevent the infection from reaching the main stem.



A B

FIG. 2.—*A*, Removing limbs formed during 1948 growing season with hand clippers. *B*, Removing lateral buds formed in 1948 for next season's first growing period.

Conclusions

It is too early in this study to draw any definite conclusions. However, there are indications worthy of consideration.

It appears that most of the advantages of this method listed by previous workers and few of the disadvantages apply to slash pine in the Southern Piedmont.

Other indications are:

1. Slash pine appears suitable for a modified form of bud-pruning.

2. Neither bud-pruning nor thinning had any appreciable effect upon height and diameter growth during the first year following pruning. Diameter and height growth for pruned trees was slightly less than for unpruned trees after two years.

3. The cost of bud-pruning was somewhat less than pruning by conventional methods. Pruning to date has been at a rate of 3.37 feet per minute.

4. Five or six annual debudding operations should produce a clear 16-foot log.

5. Bud-pruning may reduce the damage from fusiform rust by reducing the area of tender new growth in which the infection is started. It seems desirable to remove infected limbs below 2½ feet during the pruning operation.

6. A modified form of bud-pruning, using small pruners on

branches, and breaking dormant or swelling buds, appears to be as fast as removing only dormant buds. A pole tree-trimmer is more satisfactory than a ladder for pruning above the height that can be reached from the ground.

7. The optimum tree height for initial pruning was 3 to 6 feet. Buds and branches should be removed initially down to 2½ feet from the ground.

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Reduced Yield in a Dense Balsam Fir Stand

Yield in balsam fir stands may be greatly reduced as a result of overstocking. Balsam thickets are common throughout much of eastern Canada, having originated from various types of sudden stand disturbance such as blow-down, insect damage, cutting, and fire.

According to C. C. Thomson of the Dominion Forest Service (Canada), measurements taken in a 60-year old balsam fir stand at the Acadia Forest Experiment Station in New Brunswick illustrate one instance of reduced yield as a result of overstocking.

The stand followed a fire and developed on a well-drained, moderate, northern slope. Density of stocking varied with distance from the seed source.

Within the stand two plots in the densest portion and two plots in the more open portion were measured to determine the influence of density upon the yield. The results indicate that the yield of merchantable volume in the more open portion was more than double that in the very dense portion of the stand; 41 cords per acre as compared with 16½ cords.

It is doubtful whether any of the merchantable volume in the dense stand could be harvested at a profit. All of it is contained in 4- and 5-inch trees and these make up numerically only about one-fourth of the trees in the stand.

Most of the merchantable volume in the more open stands, however, is contained in trees in the 6- to the 10-inch diameter classes. Only about 6 percent of it is in trees below the 6-inch class. The stand offers a good operating chance, in which upwards of 40 cords per acre could be removed at a profit.

This illustration is not extreme for stands of fire origin. There are areas in the same locality on which balsam fir has restocked even more densely than in the dense portion of the stand described above.

A Preplanting Forest Soil Survey[1]

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A simple yet informative method of soil-site survey is herein described and offered as one answer to the problem of determining area priorities for artificial reforestation on denuded lands.

AN ESTIMATED 5 million acres of forest land in Oregon and Washington need partial or complete artificial restocking. To do this job nursery production of tree seedlings has been greatly expanded in the past few years, and both private and public forest lands are being planted and seeded at an accelerating rate. The high cost of such operations together with the great acreage requiring attention demands logically that first restocking effort should be made on land that offers the best chances for survival and good growth of trees. How best to determine the proper priority of planting or seeding areas found to require artificial restocking is a real problem to the forest manager.

In the past, selection of sites for artificial restocking has seldom been based on the inherent productivity of the site. As a result some costly planting errors have been made. Some attempts have been made to convert lands to the growth of tree species not suited to the site. Lands offering poorer survival and growth chances than adjacent sites have nevertheless been planted first. In some extremely critical situations planters have not considered the fact that soil changes caused by logging and burning have so altered the site as to require restocking with a hardier tree species than grew there before. Complete failure of plantations has resulted when planting methods were not properly adjusted to soil and site characteristics. There are also instances of plantations made on soils not suited to tree growth. These errors have been made mostly because the proper information on soil and site characteristics was not available.

To insure against such planting mistakes, a method of broadly evaluating the productivity of soil and site for planted Douglas-fir was devised in 1949 by technicians of the Gifford Pinchot National Forest and the Pacific Northwest Forest and Range Experiment Station. A field party tested the system over 16,750 acres of nonstocked land in the Yacolt burn area of southwestern Washington during the spring of 1949, and extension of the work is planned as rapidly as funds and manpower will permit.

The Method

Basic specifications of this evaluation were: (1) the system developed must be broad enough to be applied by foresters who are not specifically trained in soil science; (2) the system must allow rapid coverage of ground; (3) the resultant data must be sufficiently complete to evaluate soil and landscape conditions on areas to a minimum of ten acres in size; and (4) the sum of the soil and other site characteristics should be expressible as a numerical rating so that planting priorities may be assigned directly from the information mapped.

In evaluating the possibilities of artificially restocking a burned-over area, one must realize that the soil and topographic characteristics are most important. Of course, other conditions must be considered; seed source, brush competition, degree of existing stocking, and accessibility of the area; but these are easier to evaluate than the productive capacity of the site and will not be dealt with here.

After a study of the Yacolt burn it appeared that seven factors of soil and topography determine largely the suitability of planting sites in that locality. These factors are:

1. Soil depth.
2. Surface soil texture.
3. Surface soil consistence.
4. Subsoil consistence.
5. Surface organic matter conditions.
6. Percent slope.
7. Aspect.

In the system developed, each of these seven factors is evaluated by the rating: *3*—good *2*—medium, *1* — poor as affecting survival and growth of planted Douglas-fir. In addition to these rating values a rating of *0* is given to areas in which planting is considered impossible. Table 1 shows the rating system in detail.

In the field the terrain is classified and mapped according to this system. As each of the seven factors is examined it is rated *3*, *2*, or *1*. Areas which contain any single feature rated *0* are classed not suitable for planting. Areas in which every one of the seven factors rates *3* or *good* are symbolized *21* (7 factors × *3* rating). For all other areas a seven-number symbol is formed, each site-factor rating number being placed in the order in which it appears in the legend (Table 1). The symbol provides a ready index of the favorable and unfavorable factors of the site. The sum of the seven numbers in the symbol is placed after the symbol separated by a bar (/) and represents a broad priority rating of the site based on *21* as being the best possible situation.

To illustrate the development of a symbol and priority rating let us assume that a soil is 4 feet deep, that it has a medium-textured topsoil, that the topsoil is friable and the subsoil is moderately compact, that above mineral soil is an extensive accumulation of fine plant litter with an underlying humus layer, and that the slope is 12 percent dominantly eastward. From the mapping legend (Table 1) it is seen that the soil depth, surface soil texture, and surface soil consistence each rate *3*, that the subsoil consistence rates *2*, that the surface organic matter condition and percent slope each rate *3*, and that the aspect rates *2*. This site will then be indicated on the map by the symbol 3332332/19.

Since a site which rates *3* or *good* for all seven factors would be designated by the priority rating *21*, it is seen that the site in the foregoing example provides an excellent planting chance for this area; only a moderately compact subsoil and

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949.

a slightly less favorable aspect detract from the survival and growth possibilities that might be expected of the best site in the area, other considerations being equal.

All field mapping is done directly on aerial photographs. Before starting field work, the mapper outlines the effective area of each photograph, approximately the center 40 percent of the picture, in the office. This practice minimizes omission or duplication of field work and aids the projection of type lines to the final map. Also, in the office work such clearly defined features of topography as ridge tops and significant changes of slope can be drawn very accurately with the aid of a stereoscope.

Little training is required to evaluate and map soil depth, surface organic matter, percent slope, and aspect. Determining surface soil texture, surface soil consistence, and subsoil consistence is somewhat more difficult, but the rating classes have been kept sufficiently broad to eliminate the necessity for making fine distinctions yet still include the important features affecting seedling survival. After two days of training in the field, foresters have been found able to evaluate soils on this broad basis with proficiency.

Discussion

It is emphasized that this method of preplanting survey is not offered as a scientific classification of soils. Nor at present can the several factors be mathematically weighted as to relative importance. However, the system does provide a means of determining priority of planting based on the relative quality of a site for seedling survival and growth. Thus, a long-range planting program may be started with some assurance that the potentially most productive areas can be brought back first into forest growth.

The use of aerial photographs greatly facilitates the work. At first the plan was to survey the Yacolt burn by running compass lines at regular intervals. It soon became apparent that great areas of the burn were sufficiently uniform so that by studying the photographs and sampling typical parts of the land much leg work could be spared with no loss in accuracy of information.

Certain patterns were found to develop. For instance, wherever the *1* soil depth factor (soil over 1 foot deep but covered with a rocky erosion pavement) was applicable, the surface soil texture, subsoil consistence, and surface organic matter conditions usually rated *2*. Also, the slope rating was most often *1*, which left only the aspect to vary greatly. On the photographs the sparse brush cover on soils with depth rating *1* shows as a distinctly lighter shade than the brush on deep soils; on the ground the difference is very readily discernible. As the survey party develops in proficiency, these relationships become very apparent and many fruitless traverses may be spared.

Some measure of the difference in survival and growth among the several soil situations on the Yacolt burn is available from records of plantations on the area established at various times over the past 15 years. Where the soils are deep and conditions indicate a priority rating of about 17-21 the planted trees are making fine growth, some with leaders as long as 36-40 inches. On the other hand, where planting has been done on soils of shallow depth rating from about 11-14, the growth is extremely slow, survival is erratic, and the trees have a yellow, unhealthy appearance.

It is emphasized that such a system must be fitted to the area in which it is to be applied, because the different factors will increase or decrease in importance according to the nature of the country being worked. If a preliminary survey is properly made to learn the soil and site characteristics that may be expected over the working area, a rapidly made and valuable guide to proper planting and seeding operations can be obtained by this flexible method for a preplanting forest soil survey.

TABLE 1.—A SOIL RATING INDEX FOR DETERMINING QUALITY OF PLANTING SITES ON THE YACOLT BURN AREA

Site factor	Rating *3*—Good	Rating *2*—Medium	Rating *1*—Poor	Rating *0*—Not suitable for planting
1. Soil depth	Over 2 feet	1-2 feet	Over 1 foot deep but rocky erosion pavement covering surface makes planting and seedling survival difficult	Less than 1 foot
2. Surface soil texture	*Medium* Loamy textures	*Coarse* Sands and fine gravels predominating	*Heavy* Clays	Rock outcrop Bare Talus slides
3. Surface soil consistence	Friable	Loose (as rocky soils) Slightly compact	Moderately compact	Very compact
4. Subsoil consistence	Friable or slightly compact	Moderately compact	Very compact	———
5. Surface organic matter	Extensive accumulation of ½ inch or more of fine plant litter with underlying humus over mineral soil	Scattered plant litter but not an extensive accumulation	Bare mineral soil	———
6. Slope (percent)	0-15 percent	15-50 percent	Over 50 per cent	———
7. Aspect	North Northwest West	Northeast East	Southwest South Southeast	———

How Grazing Capacity of Mountain Range Lands Is Affected by Range Condition and Usability[1]

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THE GRAZING capacity of range lands for domestic livestock is influenced by a number of variable factors among which are the forage plant cover, climate, soil, topography, wildlife, management practices in effect, range condition, and class of livestock. These factors become more complex as we move from the plains, or more level and accessible land areas, to mountainous terrain. Likewise, the determination of grazing capacity becomes more difficult.

Early in the administration of range lands, range managers were concerned primarily with the forage plant cover. Little or no attention was given the soil. All areas supporting forage plants except slide rock, dense timber stands, and the most precipitous areas were considered usable by domestic livestock. An acre of range on a steep slope was given about the equivalent value in grazing capacity as an acre of gently sloping or level land. As the more accessible areas were overgrazed and depleted of forage plants, livestock were forced to graze the steeper slopes. Increased grazing use of the steep slopes resulted in injury both to the vegetation and soil. Unstable soils particularly were subject to trampling damage.

Grazing inspectors and range managers within the recent years have become aware that steep slopes and unstable soils have an appreciable effect on grazing capacity of mountain range. They find that soil loss often cannot be prevented even by light use of forage plants on steep, unstable slopes; that steep, stable slopes in good condition may generally be grazed lightly to moderately by sheep or cattle without damage to the soil; that grazing use should be less when the range condition is fair or poor; and that in the case of cattle range, usually only the readily accessible areas should be considered in grazing capacity estimates.

Experience has demonstrated that whenever steep slopes or areas far from watering places are included as a part of the grazing capacity of cattle range, the range will be overstocked and the most accessible areas and gentle slopes will be overgrazed and damaged. These latter areas will generally decline to a poor or depleted condition.

Range Use Classified

Many of the cattle and sheep range allotments in Forest Service Region 4, the Intermountain Region, are overstocked and overgrazed because grazing capacities are based partially on range areas which should be classed as unusable. Beginning in 1949, an analysis of all cattle and sheep allotments in the region was started in an effort to weed out unusable range areas and determine realistic grazing capacities for each allotment. The analysis will consist of three parts: (1) an appraisal of range condition and trend, (2) classification of the range for usability, and (3) the determination of grazing capacity.

It is expected that the first two phases of the analysis can be completed in two or three years on most national forests of the region. The third phase will take longer, possibly five years in some cases.

Areas of range within each grazing allotment will be segregated into two main groups. Into one group will go all areas to be eliminated from grazing capacity estimates; and into the other, all range areas to be included in grazing capacity estimates. These two groups are further subdivided into classes as follows:

Group I. Areas to be eliminated from grazing capacity estimates.

1. Waste, barren, dense timber, and inaccessible range.
2. Range unusable because of steep slopes, lack of water, poisonous plants, or other natural reasons.
3. Range used, but which should be closed to grazing.
4. Range closed to grazing.

Most of the critically eroding range will be included in the third category. This category will also include areas of shallow, unstable soils on steep slopes which cannot be grazed even lightly without causing accelerated erosion.

Waste, barren, inaccessible, and densely timbered ranges can be readily recognized. Most of them are known to local forest officers and have already been excluded from grazing capacity estimates.

Range unusable because of steep slopes, lack of water, poisonous plants, or for other natural reasons is not so easily classified. The kind of livestock using the range will affect usability classification. Cattle prefer level or gently sloping range to steep slopes, and, as was said before, will ordinarily overgraze the more accessible range before they start to graze steeper slopes. For this reason steep slopes should be given little or no weight in grazing capacity estimates for cattle. A range may have plants poisonous to one kind of livestock but not to another.

Dense patches of tall larkspur may make it necessary to classify the range as unusable for cattle, but it may be classified as usable by sheep. Distribution of watering places on cattle range may be inadequate, making it desirable to exclude certain portions of the range from grazing capacity estimates.

Areas far from water will generally be lightly used by cattle and some may not be used at all until forage near water is overutilized.

Group II. Areas to be included in grazing capacity estimates.

1. Normal use range.
2. Conditional use range.

Normal use range is defined as grazed range in excellent, good, or fair condition having either an upward trend, no evident trend, or, if a downward trend, one that improved management may be expected to correct. By improved management is meant customary good

[1]Presented at a meeting of the Division of Range Management, Society of American Foresters, Seattle, Wash., October 12, 1949.

management practices such as moderate use, seasonal deferred and rotation grazing, once-over grazing, and good handling of livestock.

Range classified for conditional use will include range in fair, poor, or depleted condition with a downward trend and accelerated soil movement which cannot be slowed down or stopped by customary good management practices, but where there is reasonable expectation that the soil can be stabilized by special management practices. Special management practices may include very light use, short or single (spring, summer, or fall) seasonal use, change in kind of livestock, grazing smaller bands of sheep than customary, and rotational grazing with use every second or third year.

Appraisal of Condition

The appraisal of range condition and trend will either precede or take place simultaneously with the usability classification. Range will be placed into five condition classes: excellent, good, fair, poor, and very poor or depleted.

Local criteria will be used in judging range condition and trend where they have been developed and where they are applicable; otherwise, general criteria set up by the Division of Range Management and Research will be used. These will be modified locally when necessary.

Range condition may or may not be judged by vegetation types. Where vegetation type maps are available from range inventories it may be more feasible to judge range condition by types. In most cases type acreages have been determined so the allotment analysis can be speeded up by using types as a basis for judging condition and trend. Where vegetation type maps are not available, condition may be judged on the basis of natural drainage units or portions of each drainage which can be delineated from the rest. In many cases the final rating for a unit or area will be an average of two or more condition classes. In other words, a range unit classed as poor may have smaller areas of range in fair or even good condition.

Areas in very poor condition, if potential flood source areas, will be marked if they are large enough to be shown on the map used for recording classification.

Both trend of the soil and vegetation will be considered and shown separately for each area. A list of soil and plant indicators of trend has been prepared by the Division of Range Management and will be used, together with certain local criteria, as guides in judging range trends.

All available plot studies, including quadrats, species plots, enclosures, and photo plot transects will be used in interpreting range condition and trends. The region has photo plot transects on most forest grazing allotments in Utah, and some on Idaho and Nevada national forests. Many of these transects have been in existence four or five years. Data collected from these photo plots since they were established show definite trends in range condition.

The best maps available, preferably on a scale of 2 inches to the mile, will be used to record range condition, trend, and usability. Range condition and trend will be shown on a separate map. Wherever range survey type maps or aerial photographs are available they will be used in preference to drainage maps alone. It has been found that range classification can be speeded up and made more accurate by using type maps and aerial photographs.

Grazing Capacity

The third phase of classification, the determination of grazing capacity, is the final product of the allotment analysis. Once the range is carefully classified and the area of usable range is accurately determined, grazing capacities can be readily ascertained.

Grazing capacities can be determined by several methods. The following three methods have been used in the Intermountain Region:

1. A method based on a comparison of actual use with proper use. Proper use is determined by observing soil and plant criteria. These criteria preferably should be worked out on similar ranges in good condition under present stocking and use, or on ranges showing definite signs of improvement with present use. Having a range which is judged to be properly used, one may then compare similar ranges and estimate the amount of overuse or underuse.

2. Actual tests of grazing capacity can also be made on representative units and allotments. This method also includes the use of proper use criteria developed on similar ranges.

3. A method based on the use of carefully checked forage-acre requirements obtained from range inventories and records of actual use. Forage-acre requirements should be checked by observing proper use criteria on the range over a period of two or more years.

Proper use will ordinarily be reached on overstocked allotments before the close of the grazing season. A careful check is necessary to determine when the range has been properly grazed. Most sheep ranges with steep slopes and unstable soils cannot be grazed more than once-over with light to moderate use of key forage plants. Some ranges will not "stand up" with light, once-over use by sheep.

Rates of stocking (acres per animal month) cannot be used for setting up grazing capacity if the range areas are not similar in plant cover and topography and usable range has not been accurately determined.

The method of range allotment analysis described should provide a more accurate and realistic appraisal of grazing capacities than any previous analysis made in Forest Service Region 4. Data obtained on range condition and trend, together with the range usability classification, should provide a sound basis for management and administration of the range resource.

Sidelights on Managing Mixed Pine-Hardwood Stands Under the Selection System

R. R. Reynolds

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The author has applied selection management for 12 years to the second-growth stands on the Crossett Experimental Forest. He describes what has been learned about stand structure, normal all-aged growing stock, minimum size of management units, and the general effect of the system upon the understocked shortleaf-loblolly pine-hardwood stands in south Arkansas.

SECOND-GROWTH shortleaf-loblolly pine-hardwood stands have been managed intensively under the selection system for over 12 years on the Crossett Experimental Forest at Crossett, Ark. Management has been on a commercial basis on a tract of 1,000 acres. Detailed records of costs and returns have been maintained. A 100-percent continuous inventory system has provided an accurate account of the changes that have taken place on each compartment.

What has been learned? Where are these selectively managed stands headed? What kind of tree diameter, stand distribution, or stand structure is likely to be optimum for all-aged stands? What reproduction and hardwood problems have developed?

Obviously 12 years is too short a time to reach final conclusions about any management system. At the same time, it does allow a certain amount of stock-taking and permits forecasting with some degree of confidence.

Stand Structure

The ragged stands upon which management was started contained numerous trees that were badly suppressed, had red heart, or were otherwise of low quality. In many places the stand structure or tree distribution in the various diameter classes was poor from the standpoint of selection management. On some acres, all the trees were mature and nearly mature; a good harvest every few years in such stands would soon result in running out of trees to cut. At the other extreme were individual acres containing only pine reproduction.

Such varied stand structure brings up an important consideration often overlooked in putting stands under management on a selection basis. In the present understocked forests, stand structure is such that individual acres cannot be managed on an all-aged sustained yield basis with the assurance that the growth and cut per acre per year can be maintained or increased. In a good many cases, 5-acre tracts cannot be managed as units by themselves. Rather, in the early years of treatment, from 20 to 100 acres should be the unit of management. Such units usually give the tree-size distribution needed to maintain and increase production. It is quite necessary that foresters learn to see and use these relatively large units rather than the individual acre as a production unit.

It is also important that the average woodland manager understand that for some years he cannot hope to develop a near-perfect stand structure out of the stands he has to start with. On some areas it may take twenty to thirty years to secure proper distribution of trees of each size class. In fact, observation over the past 12 years indicates that some individual acres may never have trees of all age classes represented. It is possible, however, that such a condition may not be undesirable. Certainly, good stand structure on each acre is not necessary in order to obtain growth rates of 500 board feet or more per acre per year. Should an attempt be made to force a preconceived stand structure, productiveness might be sacrificed.

Because of the condition of the stands when management was started at Crossett, the first job was to place them in good growing condition. The crooked, badly suppressed, leaning, and other defective trees were removed along with some good mature and near mature trees in the first commercial cut. In some places this operation meant removing up to 25 percent of the trees in the stand. Such a heavy cutting in fairly light stands raised the question as to whether all merchantable trees would be gone after only three or four or five cutting cycles.

This has not proved to be the case. It has been found that after the stands are put into good growing condition only a few of the larger, more mature trees need be cut at one time to produce the required volume for the second and later commercial selection cuttings. All-aged stands with a total of 50 to 100 trees per acre that are 4 inches and larger in diameter can well grow 300 to 600 board feet per acre annually. Furthermore, the trees now present in these stands will grow enough wood for a relatively heavy cut each five years for perhaps ten or more cutting cycles. Thus, if the stand is properly handled, there is plenty of time to secure reproduction where it is needed and to develop merchantable stems well before all the trees that were in the stand when management started have been cut.

By way of illustration, Table 1 gives the stand and cutting data for a fairly typical compartment of the Crossett Experimental Forest.

This compartment was badly understocked when management was started in 1937. Many of the pines were either suppressed or defective, some of the area had no trees of any kind, and much of the acreage had been taken over by hardwoods. The stand was deficient in trees of saw-timber size, and the stand structure for any given acre was poor. The stand contained a reasonably good number of sapling and pole-size pine, but the possibility of selection management was far from ideal.

The first combined harvest and improvement cutting removed an average of 7 trees per acre. Since then, harvest cuts have taken out an average of 14 trees per acre. This removal of 21 trees (29 percent of the stand) in ten years has not destroyed the future possibilities of continuous production on a selection basis. In fact, after ten years of management the stand averaged 78 trees per acre, or 6 more than when cutting started. Furthermore, there has been a remarkable increase in numbers of the larger trees. Stand structure has improved considerably, and, since the reproduction that has been obtained as a result of fire protection and improvement cutting is already showing up in the 4- and 5-inch classes, there is every reason to expect continued improvement in stand structure.

Before cutting was started in 1938, the stand had a volume (International ¼-inch rule) of 3,685 board feet per acre. Selection cuttings during the ten-year period removed 1,676 board feet per acre, yet the compartment ended the period with 5,600 board feet per acre.

An important point about stand structure is that all trees do not grow at a uniform rate. Stands that now have a diameter spread of only four inches may twenty years hence have a spread of 10 or 12 inches. As a result of this spreading, areas with a poor stand structure (from an all-aged standpoint) today may have a reasonably good structure twenty years hence—even with no new trees coming in.

Because of this variability in growth, many immature even-aged stands contain a wide range of diameters and are well adapted to selection management. Many of the dominant trees in such stands are rough and of low quality for sawlogs. The future crop trees must be selected from the codominant, intermediate, and, if the trees are young, even the suppressed crown classes. Of course, dominant trees of good form and quality should also be saved. This selection of trees for quality growth automatically maintains the all-diametered characteristic of the stands.

"Normal" Growing Stock

What is the normal growing stock for maximum production in all-aged second-growth shortleaf-loblolly pine stands? No one is really sure of the answer. All that seems to be known is that maximum board-foot production per acre per year will probably be obtained from a growing stock that is half or less than half of that given in yield tables as normal for even-aged stands.

At Crossett, all-aged stands that seem to be ideally stocked from the standpoint of maximum quality, board-foot volume, and growth have an average basal area of about 75 square feet per acre. This includes all trees from one inch up. Of this total, about 18 to 23 square feet probably are in trees 10 inches in diameter and smaller.

One should not worry too much if the basal area in trees 10 inches and smaller drops below this ideal for several years. If reproduction is obtained within 10 to 15 years, it will usually grow fast enough to fill in the gaps. One of the big advantages of the selection system is that it is not so dependent upon immediate reproduction of open areas as other systems.

Control of Hardwoods

Because of fires, lack of good seed years soon after heavy cutting, and cutting that killed or removed the pine and left the hardwoods, much of the growing space that should be used by pine in south Arkansas is occupied by low-grade young hardwood. In places, groups of young hardwoods occupy from 1/10 to 1/2 acre or more and are dense enough to keep pine reproduction from becoming well established or from growing. For the most part, however, the hardwood that is furnishing the real problem is from about 3 to 12 inches in diameter and from 10 to 30 years of age.

Regardless of the type of management used, it is necessary to remove at least some of this hardwood before pine can reach a dominant position. A light controlled burn often is of little help, because it usually will not kill a hardwood over one inch in diameter, even while it is killing a larger pine. A fire hot enough to kill the larger hardwoods is likely

TABLE 1.—ORIGINAL STAND PER ACRE, AMOUNT REMOVED 1938-1947, AND STAND IN 1947, COMPARTMENT 55, CROSSETT EXPERIMENTAL FOREST

D.b.h. (inches)	Trees: Before cutting 1938	Trees: After cutting 1938	Trees: Trees cut 1939-47	Trees: Reserve stand 1947	Volume (Int. ¼ inch rule): Before cutting 1938	Volume (Int. ¼ inch rule): After cutting 1938	Volume (Int. ¼ inch rule): Volume cut 1939-47	Volume (Int. ¼ inch rule): Reserve stand 1947
	Number				*Bd. ft.*			
4	11.31	11.31	0.98	13.80	..	..	..	..
5	9.42	9.42	3.05	10.93	..	..	..	..
6	8.34	8.34	2.40	5.97	..	..	..	..
7	7.02	5.08	1.07	6.13	..	..	..	..
8	4.38	3.12	.54	4.94	..	..	..	..
9	3.99	3.22	.44	4.10	..	..	..	..
10	5.27	4.62	.58	4.80	..	..	..	..
11	3.94	3.52	.72	3.57	..	..	..	..
12	3.59	3.29	.47	3.92	384	352	50	419
13	3.15	2.94	.47	3.50	431	402	64	479
14	2.80	2.42	.65	3.36	470	407	110	564
15	2.70	2.52	.37	3.19	546	509	75	645
16	1.84	1.70	.19	2.35	440	407	45	563
17	2.03	1.77	.26	2.24	568	496	72	627
18	1.12	1.03	.10	1.98	364	333	129	644
19	.58	.40	.40	1.26	219	149	149	472
20	.53	.26	.42	1.03	141	111	181	442
21	.16	.07	.33	.63	80	34	161	310
22	.05	..	.14	.49	26	..	78	275
23	..	..	.07	.12	..	..	44	74
24	.02	..	.05	.07	16	..	33	49
25	..	..	..	.05	..	..	..	37
Total	72.94	65.03	14.00	78.43	3,685	3,200	1,191	5,600

to kill much of the pine reproduction and overstory. Therefore, where some pine is present the hardwood must usually be cut, girdled, or poisoned.

Whenever there has been a pine seed source in the Crossett area, pine seedlings have generally started growing under almost any type of overtopping hardwood. Where the hardwood overstory is dense or a low thick stand of brush occupies a given spot, many of these stems die at a very early age. Usually, however, enough of the pine seedlings survive to make nearly a fully stocked stand once the hardwoods above about 2 inches in diameter are girdled, cut, or poisoned. Where the pine seedlings in the understory are only one or two years old or where they are absent, poisoning of the hardwoods may be necessary not only to kill the trees but also to prevent the development of sprouts that might outgrow the pine seedlings.

In most cases where an adequate pine seed source is available, one hardwood cutting or girdling operation is all that is necessary to insure an established pine stand. On some areas of the Crossett Experimental Forest, hardwoods 6 inches in diameter and larger were cut between 1935 and 1938, and those 4 inches in diameter and larger were removed three to five years later. These two operations have enabled pine reproduction to take over most of the space not occupied by overstory trees.

Girdling or poisoning the undesirable hardwoods may cost from $2 to $4 per acre, but where such trees make up half or more of the crown cover, the increased growth of pine will usually more than pay for the cost of the operation within 10 years.

The important thing to remember is that no matter how badly the pine seedlings are suppressed by the hardwood overstory, practically all that are 2 feet high or larger will immediately respond to release. Studies at Crossett indicate that hardly any are past redemption.

U. S. Forest Service photo

Fig. 1.—On the Crossett Experimental Forest, selectively managed second-growth shortleaf-loblolly pine stands such as this one yielded an average of 1,755 bd. ft. (Int. ¼-inch scale) per acre during the 1937-1946 period. The logs averaged 109 bd. ft. each. During the same period, the pine growing stock increased 1,446 bd. ft. per acre.

Pine Reproduction

At some stage in the handling of each acre of timberland, reproduction of the desired species is necessary. Too often, however, it is assumed that this time is right now. Actually, on a good many acres of managed all-aged stands, reproduction is needed only at fairly long intervals.

Many stands have all the trees that can grow effectively. If such trees are immature, repeated selection cuts at five-year intervals can be made before openings of any appreciable size appear. Until the openings are there, reproduction is not needed and it certainly is poor business to cut off all or a part of an immature overstory just to release any seedlings that may have become established.

Pine reproduction in a small opening or under a partial overstory often increases in height at 2 feet per year, while seedlings growing in large openings may grow 3 or more feet per year. At the same time, it seems unlikely that the height growth of the seedlings under selection forest management has much to do with final yields.

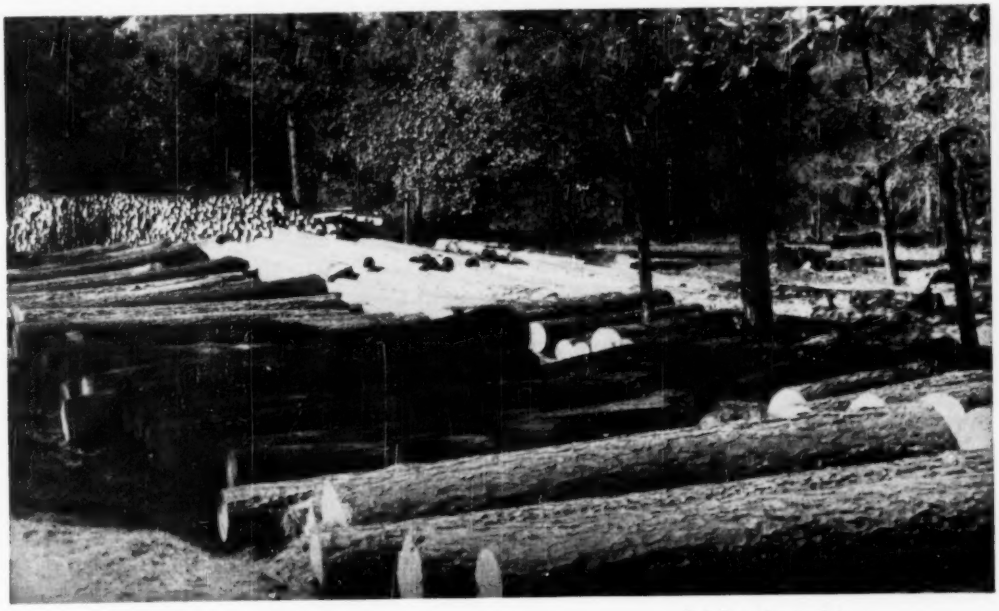
A given acre of ground has a certain productive capacity. If relatively large-size trees of the desired species are using up most of this capacity, the height growth of the seedlings occurring on the area is bound to be effected. But if most of the growing capacity of the acre is used up in growing board feet or cubic feet—so much the better. It means that reproduction is not very necessary to the productiveness of the acre at that moment. It means that a recruitment pool of medium or small trees is being maintained and that the trees in this pool need not make maximum growth until the trees suppressing them are cut. Thus, the growing potential of a site is at all times concentrated as much as possible upon trees which will be cut the soonest. The younger crop trees or reproduction do not draw site potential until promoted to activity by the cutting of an active wood producer. This concept is different from the even-aged concept, in which all trees are given good growing space and an equal chance at using site potential.

Quality Production

The principle of favoring only trees of good quality is accepted by nearly every forester. Yet too little attention has been given to the means and methods of handling the stands so that the products will be of high quality. Regardless of the type of management, trees that have grown with fairly wide spacing or that have always been dominant in better stocked stands are inclined to be rough and of poor sawlog quality.

In order to develop the early clear length necessary to high quality, groups of saplings and poles that come up in openings should probably be allowed to become very crowded before any thinning is made. Until the better trees in the group prune naturally to a desired length, thinnings should be light and should leave the cleaner codominant and intermediate trees. Once this clear length is obtained, the groups can be opened up and the selected tree or trees allowed to develop a good crown and a fast growth rate.

It should be remembered that maximum diameter growth, maximum cubic-foot growth per acre, or even maximum board-foot growth per acre is not often the real measure of successful timber management. The real measure is the maximum net return per acre per year over a reasonably long period.



U. S. Forest Service photo

Fig. 2—Sustained yield possibilities of reasonably well-stocked selectively managed stands are indicated by these products—the equivalent of one year's growth on forty acres of shortleaf-loblolly pine forest. The products include 12 M bd. ft. (Doyle rule) of logs, 17 cords of pulpwood, and 33 fence posts.

Hardwoods vs Loblolly Pines[1]

Kenneth B. Pomeroy and N. T. Barron

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COMPETENT observers have established the existence of a hardwood control problem in the management of loblolly pine. We do not propose to submit any additional proof. Instead, we wish to relate the steps being taken to bring hardwoods under control in Virginia and the Carolinas. These steps are better utilization, seedbed preparation, and reduction of hardwood competition.

Utilization

Forest Survey releases[2] indicate that hardwood growing stock is increasing more rapidly in volume than softwood growing stock. In some localities, this undesirable relationship has been improved by development of cheaper production methods and better markets for hardwood timber.

A recent venture by Southern Johns-Manville Products Corporation, Jarratt, Va., provides one example. This concern owns more hardwood than it can utilize as pulpwood and has never been able to sell surplus hardwood stumpage. In 1948, the company purchased a portable sawmill so that the larger hardwoods could be manufactured into ties, timbers, and rough lumber. Initial results were discouraging, but the operation has become a self-sustaining enterprise.

Another example of hardwood control through utilization is available on lands of the Camp Manufacturing Company, Inc., Franklin, Va. By leaving pine seed trees, cutting every hardwood that can be used, and providing adequate fire protection, the company has secured fully stocked stands of pine reproduction on many tracts. However, these good stands have only resulted on tracts logged during or just prior to a season of good seed production. Tracts cut during a cycle of poor seedfall are understocked. The latter condition is being remedied on new cuttings by seedbed preparation and reduction of hardwood competition.

Seedbed Preparation

It is generally known that any treatment causing disturbance or destruction of forest floor material will result in better germination of pine seeds. Some disturbance results from the normal activity of tractors used for skidding. Additional areas may be prepared by burning accumulated debris under controlled conditions or by using heavy equipment to scarify the ground. These treatments serve a two-fold purpose, for they also destroy many small hardwood trees and shrubs.

The use of fire in seedbed preparation has been tried by several Virginia organizations.[3] In each instance nearly all hardwoods under 4 inches in diameter at breast height were killed back to the ground, and good germination of loblolly pine seed was secured. But a large portion of the hardwoods sprouted and the total cost was high because of the protective measures required.

Mechanical seedbed preparation with a heavy-duty bush and bog disk has been tried on several hundred acres by Camp and Johns-Manville personnel. Under normal conditions, disking proceeds at a rate exceeding one acre per hour of tractor operation. Thickets, sprout clumps, and undesirable hardwoods up to 4 inches in diameter are knocked down, and frequently uprooted. This treatment is applied in mature pine stands just prior to a harvest cut. After logging is completed, special crews deaden residual cull trees so that a new stand of pine may develop without interference.

Seedbed preparation in the vicinity of West Point, Virginia, is more difficult. The problem here is type conversion, for hardwoods have been the dominant species on many pine sites for years. The Chesapeake Corporation of Virginia is attempting to reestablish loblolly pine on these sites by destroying hardwoods with bulldozers. Trees suitable for pulpwood or sawlogs are salvaged. Other trees are uprooted, girdled, or poisoned according to their size. Many tracts treated in 1947 now support an acceptable stand of pine seedlings. Other tracts, devoid of seed trees, have been reforested by planting or direct seeding of loblolly pine.

The relative effectiveness of fire and disk scarification in seedbed preparation, and the ratio of seedlings to the quantity of sound seeds available, have been observed in the Bigwoods Experimental Forest, maintained by the Southeastern Forest Experiment Station in cooperation with Camp Manufacturing Company, Inc., Franklin, Va. On tracts logged in the normal manner, tractors used for skidding stirred the duff sufficiently to create a good seedbed on 48 percent of the area. (See Table 1.) Special treatment with a disk prior to logging, or by prescribed burning after logging, enlarged the prepared seedbed to 78 and 85 percent respectively. Slash piles, stumps, and unburned margins accounted for the remaining area.

Results obtained on other lands of the Camp Manufacturing Company, Inc., indicate that scarification or burning may not be necessary when there is an ample supply of seed. But during a cycle of poor seed production, seedbed preparation may provide a means of securing an acceptable stand of pine. If such a treatment is not provided, half the site may be claimed by worthless hardwoods. As indicated in Table 2, a measured seedfall on a scarified surface usually provides four times as many seedlings as the same quantity of seeds on an undisturbed duff

[1]Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2]Forest Survey Release No. 12, Southeastern Forest Experiment Station, Asheville, N. C. April 1943.

[3]Pomeroy, K. B. Observations on four prescribed fires in the Coastal Plain of Virginia and North Carolina. Fire Control Notes 9:13-17. 1948.

TABLE 1.—SEEDBED CONDITIONS RESULTING FROM TRACTOR LOGGING AND SCARIFICATION OR PRESCRIBED BURNING[1]

Surface condition	Treatment		
	Logging only	Logging plus scarification	Logging plus prescribed burning
	Percent	*Percent*	*Percent*
Slash covered	19	18	[2]
Undisturbed duff	33	4	15
Scarified	48	78	31
Burned			54
Total	100	100	100

[1]Data furnished by K. B. Trousdell, forester, Southeastern Forest Experiment Station, Franklin, Va.

[2]Less than 0.5 percent of surface in unburned slash piles.

surface. Burned surfaces rate about midway between scarified and undisturbed surfaces, while slash-covered surfaces are very poor seedbeds.

The uncertainties of seedling germination and early survival can be minimized by "sweetening" partially stocked areas with planted trees. This is an expensive treatment when applied by hand. But the Continental Can Corporation, Hopewell, Virginia, has been planting cut-over areas mechanically within five years after logging. During this period loblolly pine slash deteriorates rapidly under prevailing climatic conditions. Even so, only 500 to 600 seedlings per acre can be planted between stumps and cull trees.

Reduction of Competition

Prescribed burning or scarification requires that scattered seedlings be sacrificed so that a better stand may be secured for the area as a whole. If pine seedlings are present in acceptable numbers but are being suppressed by hardwoods, then broadcast treatment methods must be discarded and the seedlings released individually. These seedlings can be favored by severing, girdling, or poisoning competing hardwoods. Control methods vary according to the preference of individual foresters, but all three methods are being used successfully.

A newer concept of hardwood control involving the use of fire and chemicals, such as 2, 4-D, is being tested at the Charleston, S. C., branch of the Southeastern Forest Experiment Station. Results indicate more effective control of hardwoods by the use of silvicides than by fire alone, although it is not yet known whether such control is essential or practical. If such control is desired, Chaiken[4] suggests the following practices:

1. For hardwood reduction in immature pine stands, keep the hardwoods below two inches in diameter by winter fires. Several years prior to the harvest cut, make a final winter fire and follow with a foliage spray of the sprouts during the next summer. The foliage spray should be aqueous solutions of about 0.5-percent concentration of the acid (by weight) of either the sodium salt of 2,4-D or one of the esters of 2,4-D or 2,4,5-T.

2. If the hardwoods are larger than the size that can be reduced by fire, no silvicide treatment is recommended prior to the regeneration cut.

[4]Chaiken, L. E. The behavior and control of understory hardwoods in loblolly pine stands. Tech. Note No. 72, Southeastern Forest Experiment Sta., Asheville, N. C. April 1949.

3. Because of practical difficulties, foliage sprays on a large scale are not recommended immediately following a regeneration cut.

4. Following the regeneration cut, hardwoods can be controlled by cut-surface treatments with ammate or highly concentrated oil solutions of 2,4-D or 2,4,5-T. When relatively few or large hardwoods are present, excellent control can be obtained with ammate, either as crystals in chopped cups or in solution in axe-cut frills. If most of the hardwoods are small, the stems may be cut with brush hooks, mechanical saws, or other means and the stumps sprayed or painted with oil solutions of 2,4-D or 2,4,5-T in high concentrations.

5. If fire is not desired at any point in the management program, effective control of hardwoods can be obtained with cut-surface treatments, although at a higher cost than with foliage sprays.

Conclusion

Extensive forest management, as practiced in the past in the Atlantic Coastal Plain, favors the development of low-value hardwood species at the expense of loblolly pine. This situation can be corrected by intensive management. Some of the treatments tried have been expensive and others have failed to be fully effective. But in general, results indicate that the hardwood invasion can be stopped if forest managers are willing to spend the required amount of time and money.

TABLE 2.—RATIO OF 1 YEAR SEEDLINGS TO SOUND SEEDS IN AREAS OF DIFFERENT SURFACE CONDITION

Surface condition	Seedling ratio
	Percent
Slash covered	1.4
Undisturbed duff	3.2
Scarified	13.7
Burned	7.4

Use of Fire in Natural Regeneration of Longleaf Pine

David Bruce and C. Allen Bickford

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The authors discuss the use of fire in regenerating longleaf pine in Louisiana, and conclude that both stocking and early height growth can be improved by prescribed burning.

PRESCRIBED USE of fire improves seed catch, increases survival, and stimulates height growth of longleaf pine (*Pinus palustris* Mill.) in the southern Coastal Plain. A pilot-plant study on a 1,000-acre tract in central Louisiana has demonstrated that where there are enough seed trees and adequate protection from hogs, prescribed burning can help put cutover longleaf land back into timber production without planting.

The study was begun by the Southern Forest Experiment Station in 1933. The first object was to test the effect of burning for seed-bed preparation on the germination of longleaf seed and on the early survival of the seedlings. The second purpose was to compare survival and growth of the longleaf seedlings on areas prescribe-burned at various intervals after the first year and on areas not burned at all.

The Study Area

The study area, known as the Dry Prong Tract, is in Grant Parish, Louisiana. It has rolling terrain, with a maximum difference in elevation of 120 feet. The sandy and fine sandy loam soils make the area typical of millions of acres of Coastal Plain soils on which longleaf grows better than any other pine.

Logging in 1916 left standing many small longleaf which developed into seed trees. Many of the trees must have borne seed in 1928, a good longleaf seed year in central Louisiana. The area burned over in February 1929, however, when the seedlings which had germinated in November and December were still too young to withstand fire. In 1933, there were only one or two longleaf seedlings per acre. Seedlings from earlier seed crops probably were killed by fire before they were a year old; or by hogs. Thus, in the 17-year period after logging (1916 to 1933), natural regeneration had failed.

Methods

To get different ages of rough for the test of burning for seed-bed preparation, 12 compartments totaling 385 acres were burned in the winter of 1934-1935. When it became evident that 1935 was going to be a good seed year, six more compartments, or 194 acres, were burned that October. This left 10 compartments, comprising 389 acres, with roughs from 2 to 7 years old. Compartments averaging 35 acres were used because it was then believed that fire would effectively control brown spot needle blight [*Scirrhia acicola* (Dearn.) Siggers] on such small areas.

The 1935 seed supply on the study on the study area was excellent. There were, on the average, twelve seed trees per acre, seven good and five fair. The good seed trees bore an average of 130 cones, or nearly 8,000 seeds apiece. The fair seed trees, each with less than 25 cones, supplied about 10 percent of the total seed crop. However, seed supply on different parts of the area varied greatly because the number of seed trees on individual acres ranged from zero to twenty.

In October 1935, a wire mesh fence was completed around the 968-acre tract, and hogs were removed. After seedfall, the area was protected successfully against wildfire for 7 years.

Records were taken on a systematic series of 2,011 circular milacres, of which 1,592 were used to study relation of fire to stocking in 1937 and 1942. Each milacre was rated according to nearby seed supply: light, medium, or heavy (less than 250, 250 to 550, and more than 550 cones per acre).

The study recognized five classes of overhead competition, but did not measure directly the influence of grass and other low vegetation. "Open" milacres were those 30 or more feet from a 12-inch or larger tree. Seedlings within 20 feet of such a tree suffered "severe" competition, and those 20 to 30 feet away had "light" competition. When the competing tree was less than 12 inches d.b.h., these distances were slightly reduced. Competition was further described as pine or hardwood. Most of the hardwoods were blackjack oak (*Quercus marilandica* Muenchh.), dwarf post oak [*Q. stellata margaretta* (Ashe) Sarg.], and southern red oak (*Q. falcata* Michx.).

Areas having at least 80 percent of the milacres stocked at the end of the first year were assumed to be adequately stocked for intensive forest management. Those with at least 60 percent stocking were judged to have enough seedlings for extensive management. These levels indicate minimum stands of 800 and 600 well-distributed yearling seedlings per acre. To evaluate results when seedlings were 7 years old, these levels were reduced to 60 and 45 percent, or 600 and 450 well-distributed seedlings per acre respectively.

Establishment and First-Year Survival

Seed fell in November 1935. By January 1936, there were on the average 35,000 newly germinated seedlings per acre. From place to place, numbers varied with seed supply, but the average seed supply was about the same for the fresh burns, the 1-year roughs, and the 2-year and older roughs. The 1-year roughs averaged 37,300 seedlings per acre, the fresh burns 31,100, and the older roughs 30,500. Apparently, the older roughs in the study area were not heavy enough to reduce germination seriously. Also, in this particular season and place, neither birds nor rodents seem to have made serious inroads on the seed.

These heavy stands of 2-month-old longleaf suffered severe losses

before January 1937. Almost all seedlings on 140 acres were killed by Texas leaf-cutting ants (*Atta texana* Buckley). On the other 828 acres, only 16 percent survived the first year. Heavy mortality was observed at the end of a 5-week drought in June and July 1936. Losses were heaviest on the 2-year and older roughs, where only 10 percent survived. Survival was 22 percent on the 1-year rough and 23 percent on the fresh burn. Seedlings survived a summer drought as well on the fresh burn as on the 1-year rough.

In most parts of the area, competition from older trees slightly reduced stocking during the first year. Except where there had been a heavy seed supply, in January 1937 areas with any overhead competition averaged 1,400 fewer seedlings per acre and 10 percent fewer milacres stocked than open areas. Areas with severe pine competition usually had an exceptionally heavy seed supply. They were, therefore, better stocked than open areas classed as having a heavy seed supply.

Considering only open milacres with no large trees within 30 feet, it was found that on the older roughs with a seed supply of less than 250 cones per acre, only 32 percent of the milacres were stocked (Table 1) in January 1937. This is far below the 60 percent stocking deemed adequate for extensive management. With the same light seed supply, the 1-year roughs had 2,800 seedlings with 64 percent of the milacres stocked, and the fresh burns averaged 3,500 seedlings with only 52 percent of the milacres stocked. Thus, on open areas where seed supply had been light, fresh burns and 1-year roughs had nearly twice as many well-spaced yearling seedlings as 2-year and older roughs. Only on the 1-year roughs was stocking at the level sought for extensive management.

With a heavy seed supply, open areas in both the 1-year roughs and fresh burns had over 90 percent of the milacres stocked with yearling seedlings, and the older roughs just reached the 80 percent level desirable for intensive management.

Thus the younger roughs had better stocked yearling stands than older roughs. The difference was most important on areas with light seed supply, where better survival on the younger roughs often made the difference between adequate and inadequate stocking.

Seven-Year Survival

The good yearling longleaf stands were used in the second phase of the study, the effect of prescribed burning on survival and growth. The prescription was winter fires late in the afternoon or at night. Fires backing against the wind were used whenever they would give a clean burn. A definite schedule of burning was set up to test a wide variety of fire frequencies. No compartment was burned before the seedlings were 1 year old. After that, one compartment was burned each year, 12 were burned once, 8 twice, 2 three times, and 1 four times in a 6-year period. Four were not burned at all. This test of prescribed burning came to an untimely end in October 1942, when the Army turned the area into an artillery range.

In the six growing seasons from January 1937 to October 1942, average stocking for the entire area dropped from 72 to 63 percent. The losses in percent of milacres stocked ranged from 2 percent on the fresh burns at seedfall to 8 percent on the 1-year roughs and 14 percent on the older roughs.

Regardless of fire treatment, practically all milacres with twelve or more seedlings in 1937 were still stocked 6 years later (Fig. 2). But of the milacres with one to four seedlings in 1937, more were stocked in 1942 on the younger roughs than on the older roughs, and more were stocked on areas prescribed-burned once or twice than on the areas not burned. Areas not burned showed a little better survival than those burned annually.

Severe hardwood competition and any pine competition caused heavy losses on milacres with fewer than twelve yearling seedlings (Fig. 3).

On areas with a light seed supply, only the most favorable combinations of competition and burning gave stocking adequate for either intensive or extensive management.

With medium seed supply, stocking greater than the 60 percent adequate for intensive management was found everywhere in the open and also under light hardwood competition on fresh burns and 1-year roughs. The extensive management criterion of 45 percent stocking was met in open areas on the 2-year and older roughs that had been unburned or burned twice after seedlings were a year old. A single prescribed fire on these older roughs gave 62 percent stocking on open areas.

With heavy seed supply, stocking was good except on areas annually burned and on the 2-year and older roughs where there was severe pine competition.

TABLE 1.—YEARLING LONGLEAF PINE STOCKING ON OPEN AREAS WITH DIFFERENT AGES OF ROUGH, DRY PRONG TRACT, 1937

Cones per acre	Fresh burn		1-year rough		2 year or older rough	
	Seedlings per acre	Milacres stocked	Seedlings per acre	Milacres stocked	Seedlings per acre	Milacres stocked
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
More than 550	12,800	94	9,800	91	4,800	80
250 to 550	4,200	76	5,300	82	2,800	64
Less than 250	3,500	52	2,800	64	900	32

TABLE 2.—THE EFFECT OF COMPETITION ON HEIGHT GROWTH ON STOCKED MILACRES, OCTOBER, 1942

Item	Open	Hardwood		Pine	
		Light	Severe	Light	Severe
Milacres with seedlings:	*Percent of stocked milacres*				
Over 0.2 foot high	67	43	19	34	16
Over 0.5 foot high	26	9	3	9	4
Average height of tallest seedling per stocked milacre	0.52	0.23	*Feet* 0.14	0.19	0.14

Seven-Year Growth

In October 1942, when the seedlings were 7 years old, half of the sample plots had seedlings starting height growth (over 0.2 foot to the base of the bud). Competition slowed the growth of seedlings; 67 percent of those in the open were starting height growth, as compared with only 16 percent under severe pine competition (Table 2).

On open milacres, height growth was better on the younger roughs than on the 2-year or older roughs (Table 3). One or two post-seedfall prescribed fires gave better early growth than no burning.

In January 1942, an average of 22 percent of the needles of the tallest seedlings on the milacres examined were infected with brown spot. These average infections ranged from 8 to 41 percent on areas with different fire histories. No consistent relations between average brown spot infection and prescribed burning were found, probably because with 30- to 40-acre compartments the burned areas were quickly reinfected from the unburned. Reinfection was undoubtedly more rapid where adjacent compartments had not been burned for several years than where nearby compartments were burned in the same year.

Thirteen-Year Survival and Growth

In December 1948, the most striking thing found in a visit to the study area was the greater seedling and sapling density on areas with younger roughs at the time of seedfall. One-year roughs averaged about 2,000 stems per acre against about 500 on the 2-year and older roughs. Approximately half of the 1935 seedlings alive in 1942 had been killed by the three or more wildfires that swept through the area between 1942 and 1948. Some parts of the tract had been thoroughly shot up, but these losses were local and did not upset the experiment so much as the wildfires.

The wildfires retarded the growth of surviving seedlings and obliterated most of the effect of prescribed burning by killing a large fraction of the seedlings that were 0.5 foot to 5 feet tall. Possibly they helped grass-stage seedlings on previously unburned areas. However, it was apparent that overhead competition had prevented height growth and that growth was better on younger roughs. The 100 tallest 1935 longleaf per acre averaged about 11 feet high on the 1-year roughs at seedfall and about 8 feet high on the 2-year and older roughs. In areas on 1-year roughs where the wildfires seemed to have done little damage, dominant trees in a few dense sapling stands averaged as much as 21 feet high.

Discussion

This study points out two measures that will help restore cutover longleaf land to productivity where there is a reasonable seed source and hogs are fenced out:

1. Burn one year or immediately before seedfall to prepare seedbed.

2. When seedlings are 1 to 6 years old burn once or twice as needed to reduce brown spot or herbaceous competition. Where seed supply is very light, an examination after the first prescribed burn (when seedlings are 2 to 4 years old) will show if it is desirable to plant failed areas.

The small differences in first-year stocking in open areas and under competition indicate that longleaf seedlings can stand competition from larger trees for a year. It should be feasible to insure good stocking soon after logging by leaving enough seed trees to obtain an adequate seedfall even in seed years that are only fair. The sure losses in stocking and growth caused by leaving these seed trees standing too long must be balanced against

TABLE 3.—PERCENT OF OPEN STOCKED MILACRES HAVING SEEDLINGS OVER 0.5 FOOT TALL, OCTOBER 1942

Number of post-seedfall prescribed fires	Age of rough at seedfall		
	0 year	1 year	2+ years
0	—	18	14
1	30	37	16
2	32	28	24

U. S. Forest Service

FIG. 1.—*Left:* Representative area of the Dry Prong Tract in 1935. The grass rough in the foreground is 3 years old. *Right:* Stand in 1948 on an area that had a one-year rough at seedfall and was prescribe-burned at 4 and 6 years.

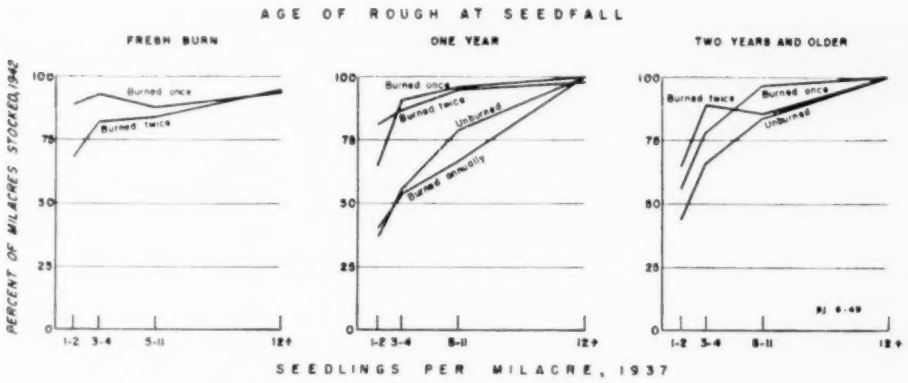

FIG. 2.—The effect of age of rough and prescribed burning after 1937 on stocking of longleaf seedlings in 1942, Dry Prong Tract, 1937-1942.

the increased value of the seed trees and possible destruction of the seedling stand by drought, ants, hogs, and untimely wildfires. Since seedlings are more susceptible to injury from these agents (except hogs) in the first year than later, most seed trees should be cut 1 or 2 years after germination.

Prescribed burning once or twice when seedlings were 1 to 6 years old gave better survival and early height growth than either no burning or annual burning. As has been noted, the 30- to 40-acre compartments were too small to get adequate brown-spot control. Larger prescribed burns should show even greater benefits in both survival and height growth from better brown-spot control.

Summary

Fire was used to prepare favorable seedbeds for longleaf pine on over half of a 1,000-acre tract of cutover land in central Louisiana. When the study began in 1933, the area had many longleaf seed trees but few seedlings. To protect the seedlings germinating after a good seed crop in 1935, the area was fenced to exclude hogs. After seedfall, no part of the area was burned until the seedlings were 1 year old. After that, some of the area was burned each year, most was burned once or twice, some three or four times, and part was left unburned for 6 years. Light winter fires were used in this test of prescribed burning that ended in 1942 when the area was turned into an artillery range.

It was found that 1-year roughs and fresh burns were the best seedbeds, not necessarily because a few more seed germinated on them than on older roughs, but because twice as many seedlings survived the first year on the younger roughs as on the older. Also, more of the yearling seedlings survived the next 6 years on the younger roughs, and the survivors made better height growth.

Prescribed burning once or twice during the 6-year period after the seedlings were a year old gave better survival than no burning or annual burning. Prescribed burning resulted in better height growth than no burning.

On the 30- to 40-acre compartments used in the study, no consistent relations were found between prescribed burning and average brown-spot infection; probably the burned areas were quickly reinfected from the unburned.

Competition from older trees had little effect on first-year stocking, but materially reduced stocking at the end of 7 years. Even more important than reduction in stocking was the inhibition of height growth caused by competition. Pine competition was worse than hardwood.

The beneficial effects of prescribed burning and of freedom from competition were especially important where seed supply was poor.

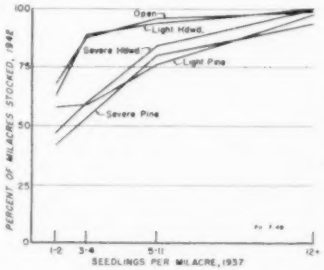

FIG. 3.—The effect of competition on 1942 stocking of longleaf pine, Dry Prong Tract, 1937-1942.

Changes in Ponderosa Pine Bunchgrass Ranges in Northern Arizona Resulting from Pine Regeneration and Grazing[1]

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PONDEROSA PINE forests in northern Arizona, particularly in the immediate vicinity of Flagstaff and Williams, have undergone marked changes in herbaceous plant cover during the past fifty years as a result of logging and grazing. Large forested areas were clearcut around the turn of the century. Even the uncut timber stands were more open than they are today. Present forest conditions contrast strikingly with early photographic records and descriptions (*4*). A deficient undergrowth of seedling and sapling pines was reported in the forest surveys of 1901-1902 and as a consequence the forest floor was more fully occupied by herbaceous species. This may explain in part why early estimates of livestock greatly exceeded present numbers.

At the turn of the century, the inadequate regeneration of ponderosa pine caused grave concern among southwestern foresters (*7, 8*). The acute problem of natural reforestation was greatly relieved when, in 1919, an unusual distribution of moisture favored the successful germination of the previous year's excellent seed crop. As a result of this rare combination of factors, a record crop of pine seedlings became established (*8, 9*). It has been reported that heavy grazing reduced the competition of grasses for soil moisture on many areas and also reduced the fire hazard of herbaceous fuel accumulations, thus favoring a high degree of survival among the numerous pine seedlings. Seedling crops of less importance became established in 1910, 1914 (*8*), and 1929 (*2*).

Although poorly stocked localities still exist, a general abundance of young pines has become established over extensive areas in northern Arizona. Young pines have filtered into virgin timber stands, extended into natural grassland openings, and restocked such cut-over areas where an adequate number of seed trees were left. This extensive pine growth has seriously increased the problems of livestock management by creating obstacles which hinder uniform livestock distribution (*3*) and by causing an actual reduction of forage.

This decline in forage was recognized by G. A. Pearson (*10*), who stated:

> It must be expected, however, that the establishment of dense sapling and pole thickets will decrease forage production. Unless this is anticipated and provided for, a time will come when the number of livestock on areas of second growth will exceed the carrying capacity, to the detriment of associated areas in the process of regeneration.

This paper presents experimental evidence demonstrating that on pine-bunchgrass range (1) grass density declines as pine seedlings become established and develop into saplings; (2) the greater the amount of the 1919 pine canopy, the less the total herbaceous cover; and (3) under protection from grazing tall bunchgrasses dominate the herbaceous cover under all amounts of tree canopy, but under the heavy grazing practiced they have largely been replaced by plants more resistant to grazing, except under the heavier tree canopies. From these findings, information on judging range condition is presented and other practices for range improvement suggested.

Description of Plots

In 1912, R. R. Hill, one of the pioneer grazing examiners of the region, established five livestock exclosures that provided a good representation of the bunchgrass forage type within the ponderosa pine zone on the Coconino plateau (*11*). The five selected sites were located within a 15-mile radius of Flagstaff at elevations ranging from 6,700 to 8,200 feet. The areas were heavily grazed and some were seriously overgrazed at the time of fencing.

In the absence of climatological records at each plot the annual precipitation and frost-free periods can be approximated from the nearest weather stations at Flagstaff, and the Fort Valley Experimental Forest (Table 1). In evaluating the average annual precipitation and frost-free periods of the five plot locations, we must consider comparative elevations, exposures, and distances from the San Francisco mountains. It is probable that the annual precipitation means and the average frost-free periods of the four lower plots were comparable to the recorded means for Flagstaff. Reese Tank, being located at a considerably higher elevation on the northern slopes of the mountains, probably received more precipitation annually and had considerably shorter frost-free periods than those recorded at either Flagstaff or the Fort Valley Experimental Forest.

The soil at Reese Tank is a shallow reddish gravelly loam with a broken surface of volcanic rock. The soils at Rogers Lake and Fry Park are heavy reddish clays of a malpais origin, whereas the soils at Black Springs and Big Fill are gravelly sandy loams of both limestone and sandstone origin. The soils outside the exclosures appear to fit the earlier soil descriptions of Talbot and Hill (*11*). As a result of livestock trampling, these soils are more tightly compacted than those within the exclosures. The thin A horizons are most clearly distinguished within the fenced exclosures, where, due to protection, the surface layer contains a higher amount of organic matter than the soils subjected to grazing and trampling. Even after 36 years of protection the A horizons within the fenced areas are only 2 to 8 inches thick.

The herbaceous understory is made up predominantly of grasses. The principal grass species which are most widely distributed over

[1]This work was made possible by a number of investigators, among whom R. R. Hill in 1912 established the fenced exclosures and obtained the early records. Quadrat chartings and observations were recorded by M. W. Talbot, W. R. Chapline, E. W. Nelson, C. K. Cooperrider, B. A. Hendricks, G. D. Merrick, and G. E. Glendening, who also established the line transects in 1941.

the five areas include mountain muhly (*Muhlenbergia montana*), muttongrass (*Poa fendleriana*), Arizona fescue (*Festuca arizonica*), squirreltail (*Sitanion hystrix*), and blue grama (*Bouteloua gracilis*).

Grass and grasslike plants which are common but more unequally distributed between the five areas include black dropseed (*Sporobolus interruptus*), pine dropseed (*Blepharoneuron tricholepis*), Kentucky bluegrass (*Poa pratensis*), spike muhly (*Muhlenbergia wrighti*), deergrass (*Muhlenbergia rigens*), Junegrass (*Koeleria cristata*), little bluestem (*Andropogon scoparius*), and sedges (*Carex* spp.).

Of these grasses, blue grama, black dropseed, little bluestem, pine dropseed, and the muhlys are warm season species and thus make their growth and are principally valuable for grazing during the summer rainy period. The rest, being cool season species, produce a considerable part of their growth and provide good forage during early spring and occasionally during fall. The best forage composition therefore includes a good mixture of these species.

Although weeds occupy only a small part of the herbaceous cover under protection, they are more prevalent on the grazed areas outside the five exclosures. The weeds include a large number of species of which a few occur more frequently than others. These include yarrow (*Achillea lanulosa*), pussytoes (*Antennaria rosea*), sandwort (*Arenaria fendleri*), thistle (*Cirsium* spp.), daisies (*Erigeron* spp.), asters (*Aster* spp.), penstemons (*Penstemon* spp.), clovers (*Trifolium* spp.), and lupine (*Lupinus* spp.).

The history of logging at two of the plots predated the establishment of the Coconino National Forthe in 1905. According to the best available records the area in the vicinity of Big Fill was first logged between 1895 and 1897, and was given a second cutting of 80 percent by volume in 1919 under Forest Service supervision. The Black Springs area was heavily cut in 1902 (Fig. 1). The Rogers Lake area was heavily logged between 1905 and 1906, and Fry Park in 1910. Thus the timber stands of these four areas at the time the exclosures were erected in 1912 included only the scattered trees left by logging. Of the five areas, only the Reese Tank plot was established within a virgin stand of open ponderosa pine timber. All areas are now fairly well stocked with stands of young pines.

TABLE 1.—THE MEAN ANNUAL PRECIPITATION AND THE FROST-FREE PERIODS FOR FLAGSTAFF, FORT VALLEY, AND THE COMPARATIVE ELEVATIONS OF THE FIVE PLOTS

Plot or station	Elevation	Mean annual precipitation	Frost-free period
	Feet	*Inches*	*Days*
Big Fill	6700	—	—
Black Springs	6900	—	—
Flagstaff	6907	21.12[1]	123[1]
Fry Park	7200	—	—
Rogers Lake	7300	—	—
Fort Valley	7347	23.17	95
Reese Tank	8200	—	—

[1]Smith, H. V. The climate of Arizona. Agric. Exp. Sta., Univ. Ariz. Bul. 197, 112 pp. 1945.

TABLE 2.—THE INFLUENCE OF PINE REGENERATION ON PERENNIAL GRASS DENSITY AS INDICATED BY 17 UNGRAZED QUADRATS LOCATED IN OPENINGS IN 1912. TEN OF THE QUADRATS CONTINUED TO BE OPEN THROUGH 1941 (GROUP A). CROWN SPREADS OF PINES ESTABLISHED IN 1919 SUBSEQUENTLY COVERED 7 OF THE QUADRATES (GROUP B)

Quadrat group and species	No. of quadrats in which present	Percent of ground occupied								
		1912[1]	1913	1914	1921	1924	1925	1933	1938	1941
A (Continuously open)										
Arizona fescue	8	0.73	1.32	1.16	1.78	1.68	3.16	2.46	1.46	0.49
Black dropseed	3	2.00	1.61	1.84	2.17	2.61	4.38	4.94	3.47	1.67
Blue grama	6	1.27	2.44	2.59	1.59	1.02	2.34	3.14	2.89	1.59
Mountain muhly	7	1.14	1.69	1.41	3.25	4.37	8.99	10.08	7.53	4.98
Muttongrass	6	0.45	0.62	0.97	0.84	1.76	3.58	2.69	1.61	0.48
Pine dropseed	4	0.49	0.53	0.36	0.06	0.41	0.88	1.09	1.67	1.17
Squirreltail	9	0.44	0.40	0.28	0.20	0.34	0.55	0.12	0.10	0.08
Other grasses	10	0.72	0.73	1.10	1.54	1.89	3.65	3.99	3.27	2.96
Total	10	7.24	9.34	9.71	11.43	14.08	27.53	28.51	22.00	13.82
B (Influenced by 1919 pines)										
Arizona fescue	7	1.78	2.24	1.79	2.42	3.28	6.64	6.50	2.71	1.43
Black dropseed	1	0.65	0.34	0.42	0.71	1.09	1.29	1.94	1.49	0.28
Blue grama	4	1.60	3.03	2.73	0.98	0.67	1.09	0.85	0.50	0.12
Mountain muhly	4	0.11	1.14	1.40	4.60	4.66	9.24	4.38	3.01	2.33
Muttongrass	6	1.60	1.32	1.62	1.45	1.51	3.78	2.81	0.91	0.20
Pine dropseed	1	—	0.02	0.02	0.10	0.23	0.55	0.26	0.06	0.03
Squirreltail	7	0.57	0.72	0.58	0.33	0.42	0.86	0.63	0.47	0.20
Other grasses	7	0.09	0.11	0.15	0.04	0.04	0.56	0.39	0.31	0.10
Total	7	6.40	8.92	8.71	10.63	11.90	24.41	17.76	9.45	4.69
Difference (A minus B)		0.84	0.42	1.00	0.80	2.18	3.12	10.75	12.55	9.13

[1]Only eight of the ten quadrats in Group A and four of the seven quadrats in Group B were charted in 1912.

Trend in Grass Density

Twenty-five permanent meter quadrats were estblished within the five exclosures in 1912. Seventeen of these were in natural openings or openings created by logging. The charts of these 17 protected quadrats were used to determine how the establishment and growth of seedling pines subsequently caused a loss in perennial grass density, this loss being independent of any livestock grazing influence.

The 17 protected quadrats were divided into two groups. Ten quadrats located in openings in 1912 and remaining continuously open through 1941 were placed in group *A*. These were distributed within the five exclosures. The 7 remaining quadrats which were located in openings in four of the five exclosures in 1912 but which became partially or completely shaded by young pines after 1919 were placed in group *B*. The difference in grass density between these two quadrat groups represents the inhibiting influence exert-

ed by the young pines (Table 2, Fig. 2).

The difference in total grass density between the two groups was less than one percent in 1912. At the time the plots were established the areas were heavily logged and heavily grazed. In response to the combined treatments of logging release and protection from grazing both quadrat groups showed a parallel increase in grass density through the 1921 charting. Prior to 1919 there was a general absence of pine regeneration and as a result the difference between the total grass densities of the two quadrat groups did not exceed one percent.

The numerous pine seedlings of 1919 had not made their appearance above the herbaceous species by 1921 (Fig. 3A). In 1924 the difference between the total grass densities of the two groups exceeded two percent density for the first time, indicating that the pine seedlings had begun to exert a suppressive effect upon the grass of the *B* quadrats.

Since the pine seedlings were inconspicuous in 1921, it is likely that their heights did not exceed 2 feet by 1924. Considering this fact, we doubt whether the shade cast by the 5-year-old pines could have seriously influenced the grass density. Dominance was largely achieved by overcoming the herbaceous competition for soil moisture. The herbaceous cover was later restricted by the additional influences of shading, the heavy accumulation of pine needle litter, and the interception of snow and rain. The difference between herbaceous densities of the two quadrat groups, therefore, increased as the small seedlings grew to sapling size and further suppressed the total grass density of the *B* quadrats.

At first, competitive growth from the pine seedlings merely retarded the increase of perennial grass on the quadrats of Group *B*. An actual decline in the total grass densities of the *B* quadrats was effected by the time the 1933 charting was made. By 1941 this decline had reduced the total grass density of the *B* quadrats below the initial charting in 1912. Thus the establishment and growth of the 1919 pine seedlings caused a loss of about 25 percent of the initial grass density.

The maximum difference between the total grass density of the two quadrat groups was reached in 1938. By 1941 the density difference between the two quadrat groups had decreased substantially below the 1938 maximum. The surrounding sapling stands were gradually closing in on the quadrats of the *A* group. Side shading and the extension of pine roots into the small openings probably caused the density decline on the *A* quadrats after 1933. Although the grass density declined more rapidly on the *A* quadrats after 1938, the final charting of the *A* quadrats in 1941 still showed a mean grass cover equivalent to twice the initial density charted in 1912.

Density trends of the individual grass species showed some interesting differences between the two quadrat groups. Arizona fescue and black dropseed showed minor losses between the initial and final chartings of both groups. Squirreltail showed a greater loss in the open quadrats. None of these grasses showed clearcut differences in behavior between the *A* and *B* quadrats. In response to protection, mountain muhly increased rapidly on both groups of quadrats. Even though this species suffered comparatively heavy losses from the development of the pines, the densities of both groups in 1941 were still greater than the densities in 1912. Mountain muhly showed the greater increase on the continuously open quadrats. The increase in blue grama from 1912 to 1913 was due to the difference in number of quadrats between these two years. While the density of this species was largely maintained on the quadrats of Group *A*, it suffered a tremendous loss by 1941 on those quadrats influenced by young pines. Muttongrass

A W. O. 184179 B K 1140A

FIG. 1.—*A*, Black Springs plot, September 1923. Area was heavily logged in 1902. Note numerous stumps on area released by logging. *B*, August 1947. Repeat photograph illustrates the area reclaimed by young sapling stands, chiefly of the 1919 seedling crop. The exclosure was enlarged to include the blackjacks (2 and 3) appearing in the right foreground of *A*. The stump, (2) *B*, indicates that one of the blackjacks was cut after 1923.

showed a trend similar to that of blue grama.

Changes in grass composition between 1912 and 1941 involved not only dominance of one species over another but also such individual characteristics as shade tolerance, response to climatic fluctuations, and seasonal growth habits. A separate evaluation of such individual grass characteristics was beyond the scope of the limited quadrat data.

Quadrat comparisons have clearly demonstrated that the establishment and growth of the 1919 crop of pine seedlings has reduced and is continuing to reduce herbaceous ground cover (Fig. 3*B*). Dominance of young pine stands over herbaceous cover can still be observed throughout widespread areas of the Coconino plateau, wherever extensive seedling, sapling, and pole-sized stands are found.

Effect of Crown Canopy

The 1919 pine stands within the five exclosures were sampled in 1948 to determine the relationship existing between the amount of crown cover and the herbaceous densities and grass yields. One hundred line transects, each fifty feet long, were used in the examination. Canopy measurements were made by recording the crown spread intercept along the transect wire. The transects were placed under 10 predetermined canopy classes ranging from 10 to 100 percent. The predetermined canopy classes were obtained by so adjusting the location of the transect wire that the crown spread intercept measured 5, 10, etc., up to 50 feet. The location of the transects was strictly determined by the selection of canopy classes and replicated samples were taken under each canopy class.

This method of sampling provided the following conditions: (1) sampling was restricted to the young even-aged stands of 1919; (2) equal samples were collected under each canopy class; and (3) being confined to the five exclosures, the influence of livestock grazing was eliminated.

The herbaceous densities occurring under the different canopy classes were determined by the line intercept method described by Canfield (*1*). These were made up principally of perennial grasses, notably Arizona fescue, mountain muhly, muttongrass, blue grama, black dropseed, and squirreltail, with lesser amounts of a variety of perennial weeds including yarrow, pussytoes, thistle, daisies, asters, and penstemon.

Canopy intercept offered the best means of measuring the dominance exerted by the trees. Although tree dominance probably extended beyond the crown spread limits, for lack of better measuring methods, canopy intercept was employed to represent the total effect of the trees and not the effect of shading alone.

An inverse relationship was found between the herbaceous density and the different amounts of pine canopy (Table 3). On all five plots herbaceous densities declined under increasing amounts of pine canopy. Measurements of species composition presented later (Fig. 5) show that grasses and weeds decreased at approximately the same rate under the increasing amounts of pine canopy. Density values showed a high degree of uniformity within the same canopy classes of the five different areas. The mean herbaceous density under a 10 percent tree canopy was about five times as great as that occurring under the 100 percent canopy.

The grass yields also declined as the amounts of pine canopy increased (Table 4). The difference in grass yields between each of the five exclosures was surprisingly small in spite of wide differences between their topographic positions. The five areas were therefore highly similar in their productive capacities. The mean grass yield under a 10 percent canopy was about five and one-half times as great as the mean yield harvested under a 100 percent canopy.

Since the productive capacities of the five exclosures were highly similar, a separate area was examined in order to determine the influence site productiveness exercised over the relationship between herbaceous cover and tree canopy. A high producing site supporting a pole-sized stand of the 1919 seedling crop was found approximately two miles from Reese Tank. This high producing site had approximately the same elevation, slope, and exposure as that described for Reese Tank. It was subject to very light grazing. The only visual difference was found in the soils. The surface soil was a deep black silt loam with a high content of organic matter, in marked contrast to the soil at Reese Tank which was shallow, rocky surfaced, and deficient in organic matter.

Under a 10 percent canopy the high producing site supported an herbaceous density of 7.8 percent and produced a grass yield of 925

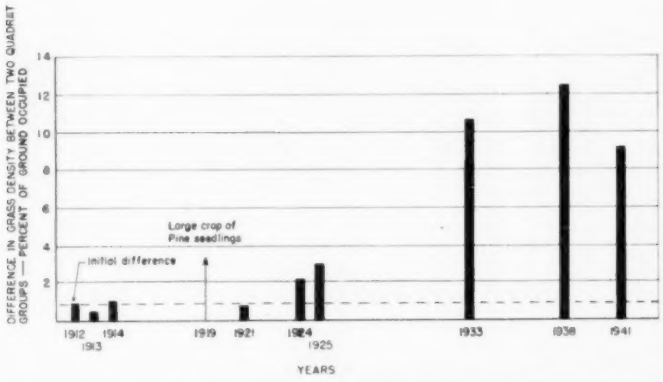

FIG. 2.—The trend in density differences between two selected quadrat groups (*A* and *B*). The increase over the initial difference represents the loss of grass density on the *B* quadrats caused by the dominance of the 1919 pine seedlings.

pounds per acre, approximately three times as great as that obtained at Reese Tank. Under a complete canopy the herbaceous density was 0.25 percent and the grass yield 45 pounds per acre at the high producing site, almost identical with that at Reese Tank. The fact that no greater amount of herbaceous cover was produced under the complete canopy on a good site indicates that the trees growing in dense stands made essentially full use of both the high and low producing sites. Such high producing sites are for the most part of local importance in northern Arizona. The productive capacities of the five experimental areas are more representative of the ponderosa pine forests as a whole. Even on highly productive sites, the occurrence of dense timber stands places a distinct limitation on herbaceous ground cover. The presence of timber stands thus constitutes a limitation not to be overlooked in the evaluation of site productivity for grazing, since the dominance of trees controls the growth of subordinate vegetation.

Under increasing amounts of canopy in the five exclosures, the decreasing herbaceous densities and grass yields showed a uniform linear regression, which proved highly significant statistically (Fig. 4). A fairly constant relationship existed between the mean grass yields and the mean herbaceous densities under all canopy classes. Each one percent herbaceous density was equivalent to an air-dry grass yield of approximately 150 pounds. This consistent relationship was largely due to the uniform herbaceous composition of the exclosures and the fact that the transects were located under the even-aged 1919 pine stands. It is unlikely that a comparable relationship between grass yields and total herbaceous densities would be found under uneven-aged forest stands subject to grazing use, since grazing frequently causes a loss of the tall bunchgrass dominants and favors the increase of secondary, prostrate growth forms. On many heavily grazed forest openings, a high total herbaceous density may consist chiefly of such prostrate weeds as pussytoes and sandworts. A high herbaceous density in this case would produce a small grass yield.

Effect of Grazing

To illustrate the effect of grazing on the herbaceous cover 260 fifty-foot line transects were located at random within the five exclosures in 1941 and compared with an equal number located on the adjacent grazed ranges. Herbaceous densities were measured as previously described. Due to randomization, crown spread measurements included seedling, sapling, pole, blackjack, and mature pines. A few deciduous trees and shrubs were included in the canopy measurements. In analysis of the data, the 520 line transects were grouped according to their crown spread intercepts into the following canopy classes: 0-1, 1-10, 11-20, and so on to 91-100 percent. The mean crown spread was calculated and the mean herbaceous density determined for the transects grouped within each canopy class.

The herbaceous ground cover was separated into three fractions to evaluate better the effect of grazing. The herbaceous composition was segregated into (1) weeds, (2) grass species that escape or withstand a high degree of grazing abuse, and (3) bunchgrass species that are highly sensitive to repeated grazing even under a moderate degree of use. Although weeds occupied only a small part of the total herbaceous cover within the exclosures, they included a large number of perennials, such as yarrow, pussytoes, sandworts, thistles, daisies, asters, and penstemons. Annual weeds, though rarely found within the protected exclosures, occurred more frequently on the grazed areas. Grasses which possessed the ability to escape or withstand a high degree of grazing included the following species in the approximate order of their abun-

A W.O. 15886 B K-1139C

FIG. 3.—*A*, Big Fill plot, October 1921. The 1919 pine seedlings were inconspicuous when contrasted with herbaceous vegetation. *B*, August 1947. The same area restocked with young pines chiefly of the 1919 seedling crop. Although the absence of young pines outside the fence was possibly due to early pine browsing damage and trampling, a healthy stand of small poles surrounded the camera point. Note change in herbaceous cover between 1921 and 1947. The numbered trees are the same in both photographs.

dance: blue grama, squirreltail, black dropseed, Fendler threeawn (*Aristida fendleri*), and Arizona threeawn (*Aristida arizonica*). The less resistant bunchgrass species included mountain muhly, Arizona fescue, muttongrass, pine dropseed, and such less abundant species as spike muhly, deergrass, little bluestem, Junegrass, and needlegrass (*Stipa* spp.).

The total herbaceous densities within the ungrazed exclosures declined under increasing amounts of the uneven-aged forest canopy (Fig. 5). Although the relationship between canopy and herbaceous densities approximated a straight line, a much greater variation occurred between the points than was obtained under the canopy of 1919 pine stands (Fig. 4). This greater variation was attributable in part to (1) the uneven-aged forest canopy, and (2) the unequal distribution of the random samples within the different canopy classes. In spite of this greater variation, the results of random sampling provided a highly representative picture of the five ungrazed forest populations.

Under protection from grazing, the taller bunchgrass species dominated the herbaceous composition within the five exclosures. The species that escaped or withstood a high degree of repeated grazing were less abundant. Each of the three herbaceous fractions occupied a fairly consistent proportion of the composition under all canopy classes. This uniform composition indicates that the herbaceous vegetation was largely in balance with the climate and that any effects of past grazing had been effaced during the long period of protection.

These results again indicate that the total herbaceous cover decreased with increasing amounts of pine canopy. In addition, they indicate that under protection (1) the bunchgrass species normally dominate the herbaceous cover; (2) the grass species which either escape or withstand a high degree of grazing abuse occur as natural components of the herbaceous composition but in subdominate abundance; (3) perennial weeds occupy a small but constant part of the total herbaceous ground cover; and (4) annuals are generally rare except for years of abundant moisture.

The effect of grazing becomes particularly apparent when Figure 6 is compared with Figure 5. The degree of grazing use was highly variable not only between the five areas but also between the timber stands and openings. Comparison of Figures 6 and 5 stresses the more erratic pattern of the densities subjected to grazing use. In spite of the extreme variation between points the inverse relationship between total herbaceous density and canopy was generally maintained on the grazed areas. The herbaceous fractions, however,

TABLE 3.—HERBACEOUS DENSITIES UNDER SELECTED CANOPY CLASSES OF THE 1919 PINE STANDS. EACH VALUE REPRESENTS THE MEAN OF TWO LINE TRANSECTS MEASURED UNDER EACH CANOPY CLASS WITHIN THE FIVE EXCLOSURES IN 1948

Canopy classes of young pines	Herbaceous densities—percent of ground occupied					
	Reese Tank	Big Fill	Black Springs	Rogers Lake	Fry Park	Means
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	
10	3.14	2.02	2.78	1.70	1.81	2.290
20	2.70	2.02	2.07	1.53	1.77	2.018
30	2.86	1.66	2.07	1.26	1.65	1.900
40	2.08	1.95	1.46	1.38	1.34	1.642
50	1.55	1.37	1.36	0.86	1.24	1.276
60	1.76	1.22	1.26	0.70	1.09	1.206
70	1.48	1.03	0.99	0.83	0.73	1.012
80	1.28	0.76	0.96	0.60	0.81	0.882
90	1.32	0.54	0.74	0.45	0.52	0.714
100	0.59	0.46	0.53	0.23	0.51	0.464

TABLE 4.—AIR-DRY GRASS YIELDS HARVESTED UNDER THE SELECTED CANOPY CLASSES OF THE 1919 STANDS. EACH VALUE REPRESENTS THE MEAN OF TWO TRANSEPTS CLIPPED UNDER EACH CANOPY CLASS WITHIN THE FIVE EXCLOSURES IN 1948

Canopy classes of young pines	Air-dry yields in pounds per acre					
	Reese Tank	Big Fill	Black Springs	Rogers Lake	Fry Park	Means
Pct.						
10	334	342	352	306	346	336.0
20	286	306	338	238	336	300.8
30	304	200	336	244	322	281.2
40	222	237	228	262	256	241.0
50	144	160	277	154	345	216.0
60	172	139	200	162	195	173.6
70	156	198	240	197	174	193.0
80	122	132	138	114	171	135.4
90	106	84	89	72	96	89.4
100	44	44	56	46	116	61.2

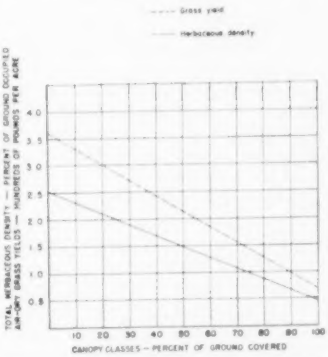
Grass yield
Herbaceous density
TOTAL HERBACEOUS DENSITY — PERCENT OF GROUND OCCUPIED
AIR-DRY GRASS YIELDS — HUNDREDS OF POUNDS PER ACRE
CANOPY CLASSES — PERCENT OF GROUND COVERED

FIG. 4.—Composite graph illustrating how total herbaceous density and air-dry grass yields are inversely related to the canopy classes of the 1919 pine stands. The herbaceous plant cover was protected from grazing since 1912.

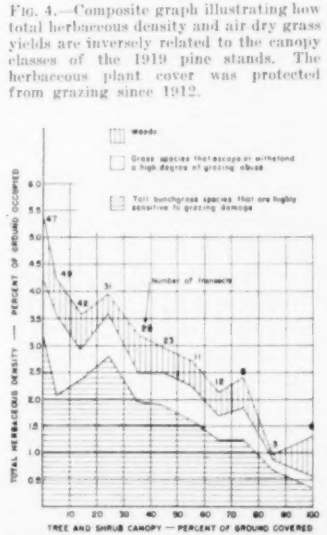
Woods
Grass species that escape or withstand a high degree of grazing abuse
Tall bunchgrass species that are highly sensitive to grazing damage
Number of transects
TOTAL HERBACEOUS DENSITY — PERCENT OF GROUND OCCUPIED
TREE AND SHRUB CANOPY — PERCENT OF GROUND COVERED

FIG. 5.—The relationship between the ungrazed herbaceous plant cover and the canopy classes of the uneven-aged forest stands of the five exclosures.

failed to show the uniform pattern such as was obtained under protection.

Further comparison of Figures 5 and 6 clearly indicates that the bunchgrass species were highly sensitive to grazing, particularly under the lighter canopy classes where grazing was intense. This supports the findings of earlier workers (*11, 6, 5*), who attributed the susceptibility of the bunchgrass species to grazing damage to their tall growth habits. By repeated removal of the tall stems and leaves the bunchgrasses on the grazed areas were reduced to a small part of the total herbaceous cover. This result contrasts sharply with those obtained from the ungrazed exclosures, where the bunchgrass species dominated the herbaceous composition.

It is further evident, from a comparison of the two figures that grass species which either escape or withstand heavy grazing occupied a greater percentage of the total herbaceous composition on the grazed areas. Earlier investigators (*11, 5, 6*) observed that the more grazing resistant species were favored as the sensitive bunchgrasses were overgrazed. Of the grasses that possess the ability to withstand heavy grazing, blue grama and black dropseed occupied a considerable portion of the density on the grazed areas. Of these two species blue grama occurred most abundantly. The ability of these species to withstand grazing was closely linked with their growth habits, notably the concentration of the short leaves near the ground level. Even so, these species also suffered severe losses in openings subjected to concentrated grazing and trampling (Fig. 6).

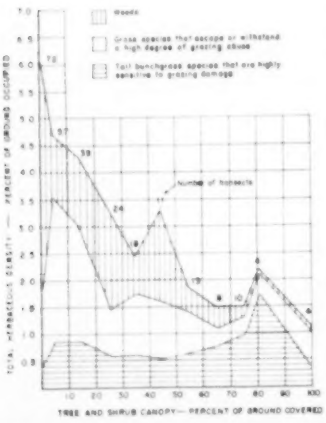
Weeds
Grass species that escape or withstand a high degree of grazing abuse
Tall bunchgrass species that are highly sensitive to grazing damage
Number of hotshots
TOTAL HERBACEOUS DENSITY — PERCENT OF GROUND OCCUPIED
TREE AND SHRUB CANOPY — PERCENT OF GROUND COVERED

FIG. 6. — The relationship between the grazed herbaceous plant cover and the canopy classes of the uneven aged stands adjacent to the five exclosures.

Squirreltail and two species of threeawns escaped grazing damage for a slightly different reason. Squirreltail, a cool season species, makes its greatest growth in early spring. The long, sharp awns of this species, which probably discourage grazing use, usually reach maturity by the time livestock enter the high mountain ranges. Arizona threeawn escapes grazing because of its awns. Fendler threeawn possesses both the short basal foliage growth and the sharp awns. Species of this kind also increased as the bunchgrasses suffered losses from grazing damage.

The amount of herbaceous cover occupied by weeds was much greater on the grazed areas than within the five ungrazed exclosures. Areas vacated by the loss of perennial grasses under heavy grazing became occupied by perennial and annual weeds. The perennial weeds were the same species as those found growing in small amounts within the protected exclosures. Annual weeds, which were found only in trace amounts within the exclosures, occurred in much greater abundance on the more heavily grazed areas.

The dominant bunchgrass species normally grew best within the forest openings of the exclosures, the maximum bunchgrass density having occurred under a forest canopy of less than one percent. Since the forest openings were most attractive to livestock, the greatest loss in bunchgrass density under grazing occurred under a canopy of less than one percent. The more resistant grasses and weeds which occurred in subordinate quantities within the exclosures became more prominent with the loss of the bunchgrass dominants on the grazed areas. Weeds prevailed where even the grazing resistant grasses suffered losses on the most severely grazed and trampled openings. Unpalatable species and weeds, such as pussytoes and sandworts, possessed a particularly efficient faculty for withstanding heavy grazing abuse. The prostrate mats and flattened rosettes of these two weeds inhabited large-sized areas in the forest openings where concentrated grazing use had seriously reduced the perennial grass population (Fig. 6). Annuals appeared most abundantly on local areas where both the perennial grasses and weeds suffered almost complete elimination.

Although the greatest grass density occurred in treeless openings within the protected exclosures, a reversal was found on overgrazed areas. On excessively grazed ranges the openings between the trees completely lacked a perennial grass cover. Remnants of the perennial grasses, particularly the bunchgrass species, grew only under the trees as isolated "islands" separated by deteriorated openings. Grass "islands" were observed on the excessively grazed and trampled ranges in the immediate vicinity of the exclosures at Fry Park, Rogers Lake, and Black Springs. The scattered trees of these areas provided the perennial grasses with some protection against grazing. This accounts for the fact that the highest bunchgrass densities occurred under the canopy intercepts of 75 to 90 percent on the grazed areas (Fig. 6).

Judging Range Condition

The decline of forage occasioned by the influx of young pine stands creates an important problem in judging range condition and trend, since loss of forage production is frequently used as an indicator of range deterioration. In judging the condition of timbered ranges one must discriminate between forage losses attributable to improper grazing and forage losses resulting from pine regeneration.

Declines in forage production due to improper livestock management are accompanied by definite changes in herbaceous composition. Based on the results of this investigation, stages of unsatisfactory range condition are indicated where the herbaceous composition

shows (1) a scarcity of bunchgrass species; (2) a replacement of bunchgrass species with perennial grasses that escape or withstand a high degree of grazing abuse; (3) a marked replacement of all perennial grass species by perennial weeds; (4) an abundance of annuals; and (5) the survival of remnant bunchgrass "islands" under scattered trees.

Declines in forage production which result from the reestablishment of pine stands are not attended by marked changes in herbaceous composition. The component species of the herbaceous cover all decline in response to timber dominance. Herbaceous decline as caused by pine stands will in time encourage improper grazing use and thus bring about discernible changes in plant composition. A periodic check of timber stands by size classes may be necessary to anticipate a forage decline.

Standards for judging the condition of timbered ranges are subject to misinterpretation when they are based strictly upon forage production. Based upon production alone, no distinction can be made between the loss of forage production occasioned by the increase in pine stands and forage losses due to improper grazing. Standards based upon successional stages of herbaceous composition do indicate when a loss in forage production is attributal to improper grazing practices. Since dominance and subordination play an important role in plant succession, condition standards should provide some means of evaluating the timber overstory as well as the herbaceous cover.

Significance of Results

The complexity of range management in northern Arizona has been greatly increased wherever extensive pine regeneration has caused a marked decline in forage yields. The adjustment of animal numbers to the available forage is an essential measure, but it does not offer a complete solution to management problems. Proper stocking requires the support of other management practices to provide more efficient use and to help stabilize the forage resource of timbered ranges. To compensate for the forage decline caused by young pine stands the range manager must first concentrate on increasing the production of depleted grassland openings. Restoration of abandoned homesteads and parks and meadows that have been seriously damaged by overgrazing and trampling may be accomplished by a more widespread application of such measures as (1) fencing, (2) reseeding, (3) rotation grazing, and (4) the installation of water retaining devices. To supplement these practices, the beneficial effect of logging release should be investigated as an additional possibility of stabilizing the forage resource of timbered ranges. In a well integrated land use program, short cutting cycles should sustain yields of both timber and forage without sacrificing tree dominance.

In addition to causing an actual decline in forage production, extensive stands of young pines have also increased the uneven distribution of livestock (3). Being isolated by surrounding timber stands, the forage in many small forest openings is not easily accessible to livestock. Small isolated openings receiving little or no grazing use may be located near large parks which are suffering serious grazing damage. To correct this uneven distribution, proper stocking requires (1) the proper location of salt, (2) riding, (3) an adequate distribution of watering places, and (4) a fencing plan which would favor a rotation system of grazing between the large grassland openings and the more lightly used timbered ranges.

Summary

1. During the past fifty years, impressive changes have occurred in the herbaceous plant cover in the ponderosa pine forests surrounding Flagstaff and Williams in northern Arizona. Early land use practices, such as heavy logging and excessive grazing followed by a widespread establishment of young pine stands, were largely responsible for these changes. In recent years young pine stands, particularly of the 1919 seedling crop, have encompassed many natural grassland parks, restocked many of the early cut-over areas, and filtered into virgin stands.

2. Changes in the herbaceous cover were determined by quadrat and transect records collected from five exclosures representing the pine-bunchgrass range type. The five exclosures, located within a 15-mile radius of Flagstaff at elevations ranging from 6,700 to 8,200 feet, were fenced in 1912.

3. The decline in grass density as affected by young pines of the 1919 seedling crop was clearly indicated by the comparison of two groups of protected quadrats, charted intermittently since 1912. The 1919 seedling pines gained dominance over the grass cover after only five years. Initial dominance was largely achieved by overcoming the herbaceous root competition for soil moisture. By 1941, the growth of the young pines had reduced the grass density approximately 25 percent below that of 1912. This reduction was shared by all grass species.

4. Herbaceous density and harvested grass yields declined with increasing amounts of pine canopy. Under protection the grass yields showed a fairly constant relationship to the total herbaceous density under the even-aged pine stands of the 1919 seedling crop.

5. The herbaceous composition of the five exclosures appeared to have reached a high degree of stabilization by 1941 as a result of 29 years of protection against grazing. Stabilization was indicated by (1) herbaceous composition dominated by the tall bunchgrass species; (2) grazing resistant species occurred in minor amounts; (3) perennial weeds occupied a small portion of the herbaceous composition; and (4) annuals occurred in small amounts. The total herbaceous density decreased under increasing amounts of the forest canopy.

6. The relationship between herbaceous density and the uneven-aged forest canopy differed markedly between grazed and ungrazed areas. The highly sensitive bunchgrass species suffered the greatest losses within the heavily grazed forest openings and under the lighter amounts of pine canopy. Grass species that were more resistant to grazing damage occupied a

greater density on the grazed areas. Perennial weeds and annuals occurred in greater abundance where heavy grazing had reduced all perennial grass species.

7. The results of this investigation provide some basic principles for judging the condition of timbered ranges in northern Arizona. Loss in forage production due to the influx of young pine stands is accompanied by no striking changes in herbaceous composition. Loss in forage production occasioned by improper livestock grazing constitutes an unsatisfactory range condition which may be recognized by (1) a scarcity of bunchgrass species, (2) an abundance of grasses that are highly resistant to grazing damage, (3) an abundance of perennial weeds, (4) an abundance of annuals, and (5) surviving "islands" of bunchgrass remnants under scattered trees.

8. Although highly important, proper stocking alone does not offer a complete solution to the range problems of timbered ranges, as the animal numbers are merely adjusted to the declining forage resource. To stabilize the declining forage resource, proper stocking should be adequately supported with such practices as (1) fencing, (2) reseeding, (3) rotation grazing, (4) the installation of water retaining devices. Since uneven livestock distribution has been greatly magnified by the increase of young pine stands, proper stocking needs to be supplemented with a more widespread application of such practices as (1) proper salting, (2) riding, (3) a more adequate distribution of water, and (4) a fencing plan which would provide better control over livestock movements and distribution.

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Notes and Comments

Federal Forest Regulation and the Welfare State

I am very much surprised to see a consulting forester come out with a statement such as the one made by Charles H. Stoddard in the November 1949 issue of the JOURNAL. It is true that forest practices under our free enterprise economic system have not been all that could be described, but I hate to see a forester admit defeat. That is what I think you are doing when you ask for federal regulation, admitting your own personal defeat and saying that Democracy won't work.

Democracy and socialism (controlled economy) are incompatible. You can't have statism or politically controlled economy and have democracy or civil liberties. The present philosophy of the federal administration is to hamper the operation of efficient private organizations and give subsidies and aids to others who have demonstrated their inability to make money on the competitive market. I do not think that it is any longer an issue of what is the best and fastest way to improve forest practices on a national scale. The real issue is: How far do we want to go down the alley to Socialism or the Welfare State?

The federal government already has a strong grip on the economy of this country and is constantly bringing pressure to bear, which will strengthen that hold. The tax laws make it possible for the government to practically confiscate as much as ninety percent of an individual's property in the form of taxes. It is held that whenever the federal government contributes financial aid to a program it has the right to regulate that program. With the money that is being poured out by the Production Marketing Administration for forest practices, we already have given federal regulation a foothold. I believe it is time that the states and individuals wake up to the fact that a subsidy is nothing but a dope administered to put us to sleep, so that we will be unaware of the transition to the welfare state. I believe that instead of looking for more and more federal money, the states and individuals should start taking less and less, and eventually eliminate federal aids from our economy.

It is also true that a great many laws are written in such broad terms, that the actual meanings and practices as carried out under the laws, are left up to the discretion of the administrative officers. It is conceivably possible that some administrative officers would be able to work injustices against individuals or corporations by their personal interpretations of ambiguous laws. Remember the O.P.A. during the war? I believe federal forest regulation would be a even crazier mad house.

If the foresters in this country want to give the welfare state a chattel mortgage on their right to work and think as free individuals, then vote to put federal forest regulation into effect. I personally like the democratic system of free enterprise, and I have faith that it will solve the problem in the end, without legislation.

FRANK SPEAREY,
Consulting Forester,
Nacogdoches, Texas.

Wood Symposium Papers Available

Foresters will find much interesting information in the papers presented at the Department of Defense Wood Symposium held June 1949 at the Academy of Science in Washington, D. C. At a two-day meeting sponsored by the National Research Council and the Office of Naval Research all phases of interest in forest products by the military establishment were discussed.

Included in the first day's session were papers on wood construction problems of each branch of the Defense Department, both ashore and afloat; wood for packaging; and chemical, physical, and mechanical properties of foreign and domestic species. The session on the second day was devoted to papers on wood deterioration by decay and insects, including marine borer problems and methods of control.

The papers presented, of which a limited supply are available from the Office of Naval Research, Navy Department, Washington 25, D. C. include the following subjects:

Summary of Research and Development Projects in Wood Supported by the National Military Establishment. Anon.

Requirements of National Military Establishment

Wood Requirements for Shipbuilding. J. G. Kuenzel, Bureau of Ships.

Wood as a Material of Construction for Land and Shore Based Structures. E. H. Dhein, Transportation Corps.

Requirements for Wood in Military Aircraft—1949. J. M. Stevens, Bureau of Aeronautics.

Anticipated Requirements for Wood in Packaging. C. K. Royce, Munitions Board.

Requirements for Wood in Specialized Uses. R. H. Wilhelm, Quartermaster Corps.

Role of the Prevention of Deterioration Center. G. A. Greathouse, National Research Council.

Chemistry of Wood

Fundamental Investigations of Wood Components. H. F. Lewis, Institute of Paper Chemistry.

Importance of Conversion Products of Wood. Alfred J. Stamm, Forest Products Laboratory.

Structural Relationships of Constituents of Wood. Ralph Shriner, Iowa State University.

Waxes and Tannins from Douglas Fir Bark. P. B. Proctor, Oregon Forest Products Laboratory.

Mechanical Properties of Wood

Properties and Engineering Uses of Wood. L. J. Markwardt, Forest Products Laboratory.

Tropical Woods Research at Yale University. F. F. Wangaard, Yale University.

Some Strength Properties of Second-Growth Douglas Fir. O. H. Schrader, Jr., University of Washington.

Balsa Wood as an End-Grain Core Material in Sandwich Construction. D. G. Reid, Chance Vought Aircraft.

Biological Deterioration of Wood

Some Aspects of the Physiology of

Wood Rotting Fungi. M. W. Jennison, Syracuse University.

Deterioration of Wood and Wood Products by Fungi. Carl Hartley, U. S. Department of Agriculture, Division of Forest Pathology.

The Biological Degradation of Lignin. S. Gottlieb, University of Maryland.

Studies on Lignin and the Mechanism of Lignification. F. F. Nord, Fordham University.

Deterioration of Wood by Insects. T. E. Snyder, U. S. Department of Agriculture, Division of Entomology.

Marine Borers

The Marine Borer Problem. W. F. Clapp, W. F. Clapp Laboratories.

A Survey of Marine Wood Borers in the Pacific. C. H. Edmondson, Bishop Museum (Hawaii).

Recent Developments in Improving the Marine Borer Resistance of Lumber and Plywood Used in Planking Naval Vessels. T. L. Shoemaker, Philadelphia Naval Shipyard.

Results of Experiments on the Effectiveness of Various Preservatives in Protecting Wood against Marine Borer Attack. J. D. MacLean, Forest Products Laboratory.

A Fundamental Approach to the Marine Borer Problem. F. G. Walton Smith, University of Miami.

The revised papers and discussions from the floor are being prepared in a single publication *Wood Symposium Proceedings*, to be issued by the Office of Naval Research, Navy Department, Washington 25, D. C.

JOHN G. KUENZEL,
Navy Department.

More on Forest Taxation

John D. Gilmour's note on forest taxation (November 1949 issue, pp. 917-918) raises several points which require discussion. His wholesale indictment of foresters for "neglecting the whole issue of timberland taxation" may be true in Canada but can hardly be sustained in respect to this country, although we may not be devoting to this problem the full effort it merits in some areas. In this connection, however, we must clearly distinguish between alleged excessive taxation as an excuse for adoption of liquidation management and the real problem of the general property tax as an obstacle to permanent forest management.

Another minor point is his counsel of perfection that foresters should "never agree to anything just because it is politically possible or the best that we can probably expect legislatures to adopt." From the practical standpoint, foresters and tax economists can do no other than accept the best they can get legislatively. If we insist that any legislature shall approve our ideal plan or nothing, we will very obviously get the "nothing." The process of educating legislatures in matters of forest taxation cannot often be accomplished in one act or in one session.

Gilmour compares the taxation of standing timber as a taxable assert with the lack of taxes levied on annual crops as nontaxable assets. He says flatly, "A timber crop should bear no taxes," because annual farm crops are not taxed. He would, presumably, agree that on a forest property from which an *annual* cut is taken, at least the cut should be taxed, or that the standing timber, comparable under these conditions to a merchant's stock in trade, should be taxed as a revenue-producing asset. Gilmour, however, is presumably concerned with immature stands from which the cut will be long delayed.

This is, of course, the type of forest property on which the annual general property tax bears most heavily. If the annual tax be higher than the discounted value of future returns, then such tax becomes inequitable or confiscatory. Gilmour's use of the annual farm crop, however, as a comparable asset is hardly justified, unless he assumes, contrary to usual taxation procedure, that all land, regardless of use, is assessed at the same value per acre. Of course a farmer's corn crop is not taxed *per se*. But the land on which that corn grows is assessed at much higher value per acre than the land in his adjoining woodlot, because of the annual revenue the land produces in terms of his corn crop. So, indirectly, his corn crop is assessed, and his standing timber is not assessed, or at least is assessed at a different value level.

With Gilmour's recommended steps 1 and 2 of his procedure for taxing forest land we can find no fault in theory, although it may be argued that all land should be similarly valued for assessment purposes lest forest land be placed in a position of conspicuous vulnerability to attack on ground of undue preference. With his step 3, (the reduction of gross tax by certain allowances for operating costs and risks) however, we do take exception. We assume, of course, that he is here discussing the general property tax, not income or capital gains taxes (where some cost allowances are already available, at least in part). The reduction of gross annual tax by the cost of fire protection, by a margin for uninsurable risk, and by the prorated cost of services (roads, police protection, etc.) not rendered directly would indeed put a timber land owner in a position of such vulnerability to attack as a coddled, preferential taxpayer that the whole system would soon be abolished by non-timberland-owning taxpayers, "and the last state of that man shall be worse than the first." Such allowances are not necessary if forest land is properly assessed on the basis of ability to pay, which is the basis of sound taxation. It is to that problem — proper assessment — that foresters may well devote their efforts. In many areas, proper assessment would very probably solve the whole problem of inequitable taxation.

RONALD B. CRAIG,
Lake City, Fla.

Quintuplet Seedlings in a Sugar Pine Seed

In the spring of 1949, while conducting sugar pine (*Pinus lambertiana* Doug.) germination tests for graduate work at the University of California, I noticed one seed which contained five developed embryos (Fig. 1).

Pines may produce as many as three archegonia within a single ovule and four embryos could develop from each archegonium. Although there is thus a possibility

Photo by Gilbert H. Schubert, Courtesy, California Forest & Range Experiment Station, U. S. Forest Service

Fig. 1.—Five embryos from a single sugar pine seed, one day after germination.

of having twelve embryos in a single pine seed, it is a rare occurrence to find more than one that develops.

One generally matures at the expense of the others. In the group of 1600 seeds being tested, there were 14 with twins and 3 with triplets besides the one with quintuplets.

Except for the 12 twins out of 1200 seeds reported by Jacobs[1] and the 2 twins out of 402 seeds reported by Johnstone[2] no other report on polyembryony in sugar pine has been noted.

No attempt was made to grow the seedlings; however, from general appearances of the immature seedlings, it seems highly probable that four might have grown and the fifth might also have pulled there is a very good chance that the fifth might also have pulled through if properly nurtured.

GILBERT H. SCHUBERT,
Calif. Forest and Range Experiment Station.

[1] Jacobs, Allen W. Polyembryonism in sugar pine. Jour. Forestry 22(5):573-574. 1924.

[2] Johnstone, G. R. Further studies on polyembryonic pine seeds. Amer. Jour. Bot. 27:808-811. 1940.

Influence of Fire and Soil on Distribution of Eastern Redcedar in the Ozarks

The distribution of eastern redcedar (*Juniperus virginiana* L.) in the Ozarks is so closely correlated with shallow limestone soils and rough topography that these sites are often considered the characteristic habitat of the tree. Systematic observations in the Arkansas Ozarks indicate, however, that redcedar does not prefer these shallow soils or "glades" but that competition and fire wipe it out on the better sites. Some of these conclusions are similar to Harper's observations east of the Mississippi River.[1]

Fire

Fire is the worst natural enemy of eastern redcedar. The species cannot maintain itself in areas that burn over frequently. The bark is so thin—rarely more than 0.3 inch thick—that heat from one surface fire usually kills even mature trees. Eastern redcedar does not reproduce by sprouting. Once the tree is killed, therefore, reproduction must come from seed, which is distributed chiefly by birds and rabbits that use the fruit—a small, berry-like cone—for food, especially in winter.

The rough, stony sites on which the present stands of eastern redcedar are found do not burn over easily. The scarcity of other species slows down the accumulation of litter, and redcedar litter itself does not burn very readily. In addition, there is usually so much bare rock that fires soon go out for lack of continuous fuel.

The effect of fire on the distribution of eastern redcedar is typically demonstrated in Sharp County, Arkansas. In 1854, one settler tried to locate a few redcedar trees to plant in his yard. He searched over 700 acres and found 12 young trees. Today, under fire protection, redcedar is plentiful in the same area.

Depth of Soil

The Ozark soils are predominantly shallow, with many limestone and occasional sandstone outcrops. More than half of the region is covered with soils less than 20 inches in depth to the unconsolidated parent material. Eastern redcedar has a shallow, fibrous root system that is particularly adapted to shallow soils. In addition, it will grow on drier sites than shortleaf pine (*Pinus echinata* Mill.) and the native commercial hardwoods of the region. Redcedar is therefore one of the first commercial forest species to occur in the ecological succession.

Where the soil averages less than 12 inches in depth, redcedar seldom grows taller than 20 to 30 feet. Fence posts are the principal merchantable product. Where the soil ranges between 12 and 24 inches in depth, redcedar averages about 35 feet in 50 years and can produce one or two small 8-foot sawlogs.

The best growth of redcedar in the Ozarks is on well-drained alluvial soils and on upland soils that exceed 24 inches in depth. On these sites, it averages about 45 feet in 50 years but is often seriously crowded by other trees. Because of the abundance of other trees, especially hardwoods, litter accumulates rapidly and fires are frequent, tending to eliminate the species.

Soil Acidity

Contrary to common belief, soil acidity appears to have little effect on the occurrence and distribution of redcedar in the Ozarks. Natural stands were examined where the pH of the soil ranged from 4.7 to 7.8. In general, the shallow soils under 24 inches in depth tested nearly neutral, whereas the deep soils, especially those in abandoned fields and those of sandy texture, were generally acid. Yet redcedar is usually the first forest tree to invade old fields in this region.

The soil under dense stands tested less acid than under open, poorly stocked stands. Although numerous natural stands are found on acid soil, they are generally young and immature, composed of saplings and post-sized trees. In

TABLE 1.—LIME (CALCIUM OXIDE) CONTENT OF REDCEDAR FOLIAGE

Soil depth to parent rock (Inches)	Trees (Number)	Age class (Years)	CaO (Percent)
Under 12 ..	1	5-10	1.88
Under 12 ..	1	15-20	2.14
Over 24 ...	1	5-10	2.22
Over 24 ...	1	15-20	2.58

JOHN L. AREND,
Southern Forest Experiment Station.

[1] Harper, R. M. The diverse habitats of the eastern redcedar and their interpretation. Torreya 12:145-154. 1912.

four old fields partially stocked with redcedar, the pH of composite soil samples under the trees was 6.6 at a depth of 0 to 3 inches, and 6.1 at 3 to 6 inches. At the same soil depths in the open, the pH was 5.5 and 5.2.

The acid soil condition in those portions of old fields outside the redcedar stands may reflect a species preference for alkaline soils. On the other hand, it seems more probable that the neutral to alkaline soils found under redcedar are the result rather than the cause of the occurrence of redcedar.

This supposition is substantiated by the records of a redcedar stand planted in 1903 in one arbitrarily chosen corner of a worn-out field. In 1947, the pH of the soil in the old field outside the plantation was 5.4 and 5.0 at depths of 0 to 3 inches and 3 to 6 inches, respectively. Inside the plantation, the pH was 7.0 and 6.25 at the same depths. Spurr, working in Connecticut, also found the surface soil in old fields to be less acid under redcedar trees than in the open.[2]

Calcium Content of Foliage

The reduced acidity of the soil under dense and long-established stands of eastern redcedar probably results from the relatively high calcium content of its foliage. Table 1 gives the percentages of CaO found in foliage samples collected in August 1948 from redcedar trees that were growing on soils developed from mixed limestone-sandstone rock material.

JOHN L. AREND,
Southern Forest Experiment Station

[2]Spurr, S. H. The influence of two *Juniperus* species on soil reaction. Soil Science 50:289-294. 1940.

Pocket Gopher Control in Forest Plantations

In the spring of 1947 it was observed that damage by pocket gophers to young trees in forest plantations of Eau Claire County, Wisconsin, was becoming serious. In one three-year-old plantation in the Eau Claire County School and 4-H Forest, loss of approximately sixty percent of the trees was attributable to gophers. In other areas trees as high as eight feet had been killed.

The gophers destroy the trees by cutting off the roots under the surface of the ground. Many trees of various sizes with a slightly droopy appearance could be picked up or tipped over with very little effort, all the roots having been cut off close to the root crown.

The situation was called to the attention of the County Forestry and Zoning Committee, which authorized a gopher control program in the forest. The method selected was one recommended in Conservation Bulletin 23 of the Fish and Wildlife Service, U. S. Department of the Interior. Cut vegetable bait, poisoned with powdered strychnine alkaloid, was placed in the burrows by a method hereinafter described.

During the spring and fall season the gophers burrow mainly 4 to 8 inches into the ground. During the hotter summer weather they burrow more deeply. Therefore spring and fall are favored for control measures. Burrows are more readily located and baited than during the summer.

Carrots were found to be the most satisfactory bait material as they stay fresh after being cut and the strychnine adheres readily to the cut surface. They were cut lengthwise in about 3-inch lengths and about one-half-inch in diameter. Two quarts of cut bait were placed in a ten-quart pail, and one-fourth ounce of strychnine alkaloid was sprinkled over the bait and stirred to obtain even distribution of strychnine over the bait. Operators wore gloves and handled the bait with tongs to avoid possibility of being poisoned.

Burrows were located by using a $\frac{3}{8}$-inch steel rod as a probe. Shallow burrows are frequently located by feeling the ground give underfoot. Even in spring and fall burrows are at two levels; the upper about three to four inches; the deeper level about eight to twenty inches. In plantations, burrows are frequently found in the rows of trees, six to eight inches under the surface.

When the burrow has been located by probing with the rod, the hole may be enlarged by using a round stick or rod three-fourths of an inch or one inch in diameter, being careful not to punch another hole in the bottom of the burrow. A piece of bait is then dropped down the hole into the burrow. The hole may then be plugged with grass, leaves, or twigs to prevent earth falling down the hole and covering the bait, and the plug may then be covered with earth.

Several baits should be placed in each system of burrows, making sure there is bait in burrows at different levels.

It is important that no areas with gopher workings be missed. In plantations where there are varying degrees of infestation the whole area should be gone over systematically. A picket stake with a flag is a good aid to following through on a definite strip. In young plantations with regular rows across an area the stake may bet set in a certain row and a given number of rows worked on each side. Under some conditions it is necessary to set the stake on a compass line. Where growth is dense it is found advisable to work compass strips no wider than one-half chain, and a section of the strip of about equal length with each setting of the picket stake. When a section has been worked the operator pulls the picket and paces ahead one-half chain and resets the stake.

A crew of two or three men works more effectively than one man alone. With a three-man crew, one man acts as compass and stake man, one as burrow locator, and one as bait placer.

Inspection of controlled areas in the fall of 1947 and again in the spring of 1948 indicated control measures to have been virtually 100 percent effective. The only new workings discovered in the area were around the outer edges where gophers had apparently started to move in from surrounding areas on which control measures had not been applied. Costs for the 1947 season averaged 58 cents per acre for 240 acres of forest plantation.

In the spring of 1948 a continua-

tion of gopher control work in county forest plantations was authorized, and 700 acres of plantation were covered, using the same methods found to be effective during the preceding season. Per acre cost was slightly higher, 64 cents, due mainly to a higher wage scale.

Our experience indicates that it is advisable to inspect, early the following spring, the outer borders of areas controlled the previous year. It is probably advisable to control a fairly wide buffer strip around plantation boundaries in order to reduce the possibility of gophers moving in from adjacent areas.

Gopher control work completed during 1948 appears to have been fully as effective as that done during 1947. The control measures as outlined are established as a part of the forest protection program in Eau Claire County. It is certain that many thousands of young trees have thus been saved from destruction, at costs only a very small fraction of the value of the trees.

J. B. TASKER, *County Forester, Eau Claire County, Wis.*

Supreme Court Upholds Forest Practice Act

The action of the United States Supreme Court on November 7, 1949, upholding the decision of the Washington State Supreme Court, established the constitutionality of the Forest Practice Act which became effective in Washington in January 1946.

The law was originally contested by a group of timber-land owners who maintained that the act was an infringement of their rights as private property owners. That view was supported by the Superior Court of Stevens County, but its decision was later reversed by the State Supreme Court.

The act provides that regeneration of cutover timber-lands must be assured by the owner of the land. Minimum requirements are that seed blocks equal to five percent of the area cut under the clearcut system or trees below a specified diameter in the selective system must be left to reseed the area. In the event that neither of these systems is applicable, an operator may file a prior cutting plan which might provide a seed source in some form of staggered or alternate settings or he might post a bond guaranteeing the natural regeneration of the area within five years. If at the end of that time the area has not adequately restocked, the bond is called and the State Division of Forestry plants the area.

According to B. L. Orell, supervisor of forestry in Washington, "The significance of this decision to the Division of Forestry is that it affirms the right of the State to control the use of a basic natural resource for the good of the state and the nation." Seventeen states have laws requiring varying degrees of assurance that forest cutting will be conducted in ways to assure continuous forest growth.

Forest owners who manage their lands on a sustained yield basis have long been taking measures provided in the Forest Practice Act to maintain the productive capacity of their holdings, according to Mr. Orell. These owners were instrumental in getting passage of the act, he said. The Forest Practice Act, now constitutionally upheld, enables the state to compel the compliance of owners who otherwise would not take measures to ensure perpetual harvests.

An Unknown Pioneer in Prescribed Burning in Burma

In 1917, while serving as chief of forest management in the Forest Service, Region 3, Albuquerque, N. Mex., the writer was detailed to accompany F. A. Leete, an English forester who had served as chief conservator of forests for Burma, then touring this country to study logging and utilization methods. During conversation about his work in Burma, he brought up the subject of teak regeneration.

It seems that at that time recent investigations had shown that on unburned areas teak reproduction was practically nil, while on areas exposed to fire it was relatively abundant. Mr. Leete then stated that a young British forester employed in the Burma Forest Service had discovered this fact "some twenty years previously" but his ideas had met with disapproval and rejection, and had resulted in his being kept from promotion. As the result of the conspicuous failure of reproduction of teak under the prevailing practice of fire exclusion, the modern methods of prescribed fire were then adopted.

The writer did not learn from Mr. Leete at the time the name of the man who was willing to, and did, run the risk of official ostracism for the sake of ecological truths. Recently, in reading an article on Indian Forestry by E. P. Stebbing[1] this incident was found recorded. The young forester's name was H. Slade, and the date of his discovery 1897. After a successful administrative career he died of fever in 1905.

On page 115 of this article Mr. Stebbing states, "Before the close of last century, a brilliant forest officer in Burma, H. Slade, first questioned the correctness of the practice of indiscriminate fire protection for all classes of teak forest. From the Inspector-General downward he was treated with scorn. Slade's query was taken up by a few forest officers. The first result in Burma was a stiffening of the attitude of the authorities, the area protected rising between 1897 and 1907 from 1856 square miles to 8153 square miles. In 1905 Troup in Tharawaddy carried out some enumerations which seemed to show that the younger teak age classes were more numerous in burned areas of teak forest than within the protected areas . . . After the lapse of a few years the general opinion of Burma forest officers was that fire protection in the moist forests, owing to the dense growth of evergreen shrubs, softwooded species, etc. which grew up, preventing the

[1] Stebbing, E. P. Recent progress in Indian forestry. Indian Forester 52:104-117. 1926.

young teak from developing, was a mistake . . . By 1923 the area protected had fallen to 142 square miles."

In order to remove any misunderstanding of what happened in Burma, it must be understood that "fire protection" meant complete exclusion of fire. Under this regime, which was quite successful in its objectives, a dense jungle of worthless evergreen hardwoods rapidly invaded the former forests, in which fires had burned frequently, set by the natives to benefit grazing. Under the new policy, the value of fire in keeping out this "climax" growth, in favor of the temporary or transition type of which teak, a light demander, was a component, the use of prescribed fire was substituted, under control of the forest officers, who were able to use or to exclude it as the condition of teak reproduction demanded. This situation closely resembles the problem facing southern silviculturists in preventing the invasion of inferior hardwoods in place of loblolly pine.

There are many startling parallels between forest management in India and in the United States, with the former usually from twenty-five to fifty years ahead in point of time of occurrence.

H. H. CHAPMAN.

Forestry Historians Ask Aid

Charles D. Smith, 2 Shaler Lane, Cambridge, Mass., a graduate student at Harvard University, is presently writing a thesis titled "Creation of the Eastern Forest Reserves." He hopes to recreate the "emotional fervor and the crusading spirit of the earlier days" in describing events leading up to the passage of the Weeks Act in 1911. He will also survey the activities involved in the physical establishing of the reserves.

Another forester, Mahendra Prakosh, Forestry Department, Jaipur (Raj.), India, is interested in learning the history of tree planting throughout the world.

Both men would appreciate having correspondence or publications from members with knowledge of the subjects.

A Three-Man Planting Crew

During the 1949 season, I had a contract for planting 75M trees for private landowners in Schoharie County, New York. Having had my share of being bored as a foreman and being worn out wielding a mattock all day as a planter, I organized my crew on a different basis from that ordinarily used.

Enquiries to four forest experiment stations revealed that except on easy sites a mattock is most often used and that one man does the whole job. Only in the Northeast do two men work together, one man opening the hole and the second inserting the tree. The average number of trees planted per 8-hour man-day is about 700-800. Joshua Cope, extension forester of New York, claims 800 per man for his men. An article by a forester in the *New York Conservationist* sets the figure at a modest 500 for inexperienced labor.

I use a 3-man crew exclusively and have no average to report. The three of us plant 4M trees a day and stay out until we finish, regardless of the time. One man walks between the planters, handing out trees and carrying the pail. At the same time he can keep the lines straight, check on the spacing, and watch out for careless work. The planters use a mattock, swinging so that the handle is below the knees, to open the hole and to tamp (but not pound) the soil in place after the tree is inserted. Every 250 trees we change around so that one man is always resting and the need for rest periods is eliminated.

Planting for farmers in New York usually means working in a rocky, steep back lot once grazed but now abandoned to brush and saplings. Even on such sites we can easily put in 500 trees an hour; and on exceptionally good ones have doubled that number.

Of course, the rate of survival can only be determined after a number of years. The official inspectors, however, have declared themselves well satisfied with the work, done at a price less than that charged by machine planting in the same area.

HENRY S. KERNAN,
South Worcester, N. Y.

Erratum

In the December 1949 JOURNAL OF FORESTRY, line 2 of the table in the second column on page 981 should read:

Burning brush, repairing fences, and bulldozing gully roads and firefighting lines	$.74.

We Present

Carl A. Rishell: Timber Engineer

Every weekend from early spring to late fall a 23-foot boat heads out into the Chesapeake Bay carrying two men, usually both from the staff of the National Lumber Manufacturers Association or its affiliate, the Timber Engineering Company. The skipper is Carl A. Rishell, director of research for both these organizations.

His love for boats is old, his interest in wood and woodworking older. Combined, these interests generated the enthusiasm and energy needed for Carl to build his own craft in order that he might better partake of his favorite sports, boating and fishing. When the *Stella V* was launched she was one of the few small private boats with laminated keels and ribs; a logical result when the builder was so largely responsible for, and keenly interested in, the development of laminated ship timbers early in World War II.

During the recent war, small wooden boats were suddenly needed in large quantities. Carl, a Navy veteran of World War I, realized the need. In the initial pioneering stage his vision and determination were vital in maintaining interest and getting a research program under way. Early trials were unsuccessful, but ultimately through the cooperative efforts of wood product fabricators, adhesive manufacturers, and government laboratories, a successful system of laminating wood for ships' timbers was developed. A Certificate of Commendation awarded by the Navy hangs on his office wall as a memento primarily of his activities in the development of laminated wooden ship keels.

When in 1944 the National Lumber Manufacturers Association and the Timber Engineering Company established a research division, the officers of the two organizations selected Carl as the first director of research for these affiliated organizations. To understand why he was selected for this important industrial assignment, we must understand some of the qualities and characteristics of the man himself.

Carl Allison Rishell was born February 27, 1898 in Emporium, Pa. He entered the Pennsylvania State College, but his forestry education was interrupted by World War I. Returning to Penn State after service in the Navy, he was graduated in 1923.

Hired by the W. M. Ritter Lumber Company of Columbus, Ohio

CARL A. RISHELL

as an assistant kiln operator, he soon showed himself to be a man of vision and energy, capable of overcoming problems and improving methods of production. As a result of this ability, the company created a new job, that of chief kiln operator of all plants. This assignment was given him in 1926. One year later he was promoted to assistant superintendent of manufacture of all operations and subsequently was made superintendent of the flooring and planing mill at Maben, W. Va.

While with Ritter Lumber Company he put the kiln-drying operation on a sound technical basis which resulted in faster drying and less degrade. Another outstanding service was a study he made in methods of cutting low grade lumber for conversion into hardwood flooring, a development which resulted in considerable savings in raw material and also reductions in the cost of manufacture. He also designed storage sheds to maintain proper moisture content of kiln-dried flooring. For controls he merely used the weights of blocks of known oven-dry weights to indicate how the conditions in the storage shed should be changed. Thus it became simple to instruct any nontechnical worker how to maintain the flooring at proper moisture content.

In May 1934, Mr. Rishell went to Washington, D. C. as assistant chief of the Cost and Price Department of the Lumber Code Authority, later becoming technical assistant to the administrator of the Forest Products Industries Division, and finally project head of the Division of Research and Planning National Recovery Administration.

In 1936 he was employed by the National Lumber Manufacturers Association as chief of its Hardwood Division. He has been with the association and its affiliate, the Timber Engineering Company, since that year.

Two of his outstanding accomplishments as products engineer for the National Lumber Manufacturers Association are now widely known, although the importance of his participation in the project is not generally recognized. The tremendous number of wooden boats constructed during the second World War is a monument to the foresight and persistence of him and his co-workers in industry and government in promoting and developing the use of laminated timbers. He was instrumental also in interesting the

federal government in the construction of the wood-sugar-alcohol plant at Springfield, Ore.

As the director of research for the Timber Engineering Company he has built up a research group, originally of two men, into a staff of technologists, chemists, and assistants that now numbers twenty-two. He is a source of many ideas for new wood products, including laminated wallpaper rollers, cigarette proof furniture tops, a quick-setting room temperature glue, and Milpak—the sawmill produced, short, bundled hardwood lumber.

A full Member of the Society of American Foresters, he helped establish the Society's Division of Forest Products. He is one of the original directors of the Forest Products Research Society, and is a fellow of the American Institute of Chemists.

The conservation of our nation's timber resources is accomplished not alone by increased reforestation, by better protection, by applied silviculture, by improved logging methods. Conservation is accomplished also by closer utilization of wood and by the development of techniques to decrease wastage and to permit lumber, in all its myriad forms, to last longer in the service to which it is put. As one of industry's outstanding timber engineers and directors of research, Carl Rishell's contributions benefit not only the science of wood technology but the entire field of forestry as well, and conserve the resource as well as the utilization of it.

Rule of Thumb for Standing Tree Volume

"How many board feet in that tree?" That question, put to many foresters by farmers and others, has brought forth apologies, bad guesses, or an outright admission that the forester did not know until he could refer to a volume table.

Foresters who do not carry volume tables with them should not have to fumble for a reasonably close answer. Here is the rule for trees having diameters between 16 and 36 inches:

Board feet (Scribner) $= d\ (d \pm x)$, in which
d = d.b.h. in inches,
and $x = +3$ for $3\frac{1}{2}$-log trees (56 ft. merchantable height)
$= \ 0$ " 3 " " (48 " " ")
$= -3$ " $2\frac{1}{2}$ " " (40 " " ")
$= -6$ " 2 " " (32 " " ")
$= -9$ " $1\frac{1}{2}$ " " (24 " " ")

In other words:

For 3 log trees, squaring the diameter gives board feet, Scribner.
For $3\frac{1}{2}$ log trees, *add* 3 to d.b.h. and multiply by d.b.h.
For $2\frac{1}{2}$, 2, or $1\frac{1}{2}$ log trees, *subtract* 3, 6, or 9, respectively, from d.b.h. and multiply by d.b.h.

A test of this rule will show that it indicates volumes corresponding to trees in form classes ranging from 74 to 86. Accuracy, however, is not what recommends this rule; ease of application without strain on the memory is its principal advantage.

STANLEY S. LOCKE,
Soil Conservation Service.

Reviews

New Knowledge in Forestry.

The Report of the Chief of the Forest Service, U.S. Department of Agriculture. 58 pp. Superintendent of Documents, Government Printing Office, Washington, D. C. 1949. 15 cents.

Forestry in the United States had to start from scratch, and in many of its aspects, professional knowledge of the diversity of North American species, soils, biological, ecological and climatic factors is still rather meagre compared to the task foresters face in making each acre of forest land produce its maximum for this and future generations. However, in devoting his annual report mainly to the research functions of the U.S. Forest Service, Lyle F. Watts, chief of the Service, is able to recount a steady march of progress—progress which is often too little known and too little appreciated even by the foresters who are putting its results to work.

Research has long been a major field of federal forestry. It began in 1876 when Congress authorized the Commissioner of Agriculture to appoint a special agent "to prosecute investigations and inquiries" as to consumption, importations and exportation of timber and other forest products, the probable supply for future wants, and the best means adapted to their preservation and renewal. Since that time, eleven regional forest and range experiment stations in continental United States have become the major sources of information concerning the practice of scientific forestry. In addition a Tropical Forest Experiment Station is maintained in Puerto Rico; and Alaska has a research center. If appropriations are forthcoming, an Alaskan station, authorized 21 years ago may be developed, as may also a Great Plains station.

The Forest Product Laboratory, established in 1910, has become the world's outstanding institution for the scientific study of wood and its uses. In two world wars it made vital contributions to the United States and its allies. In peace, it contributes quietly, but none-the-less effectively to the wise, economic use of the products of the forest.

Forest Service research includes six functional divisions: forest management, range, forest products, forest economics, forest influences, and fire research. A seventh division, concerned with dendrology and range forage investigations, serves all agencies in the Department of Agriculture.

The newest research division is that directed toward forest-fire control. Established in 1949, it has a background of experience and study by both public and private agencies and organizations. With funds and authority to move into the field of new techniques, it should take a major place in the Service's research functions. For fire prevention, pre-suppression, suppression, and control probably account for the greatest expenditure of funds in American forestry, as we know it today.

Significant also is the growing development of research toward the business of growing timber and other forest and range products. No longer can critics of "researchers" question the validity of research. More and more timberland owners and managers are pressing the research staffs for information which will help them make forestry pay dividends, today.

As Mr. Watts points out, "We have plenty of good forest *land* in the United States." Well-planned, well-directed research is the first step toward assuring the American people of continued yields of all forest benefits.

ALBERT G. HALL.

Twenty-year Progress Report (1928-1948) of the Black Rock Forest.

By Henry H. Tryon and Raymond F. Finn. 89 pp. Illus. Bul. No. 14. The Black Rock Forest, Cornwall-on-the-Hudson, N. Y. 1949.

This attractive and readable bulletin from The Black Rock Forest in the Hudson Valley of New York is a substantial addition to our knowledge of the silviculture of the oak-chestnut-yellow poplar forest of the eastern United States. This very extensive and complex forest has received far less study than its economic importance, in the widest sense, deserves.

For twenty years Black Rock has been a privately endowed center of research within this forest. It has been under the continuous direction of Henry H. Tryon, who with Raymond F. Finn in this bulletin brings up to date the findings from a number of studies, and summarizes others covered in previous bulletins or papers. More fortunate than most research foresters, Tryon here writes chiefly of investigations which he not only began but has conducted without interruption to date. Furthermore, he has conducted them not seasonally, or from a swivel chair, but in the woods the year around.

Harvest cuttings in mature—that is, sawtimber—stands, the authors believe from experimentation should be some form of shelterwood. They recommend cutting these essentially even-aged stands of hardwoods (occasionally with hemlock) in three steps: a preparatory cutting, generally light and in the nature of a cleaning, to reduce the proportion of less desirable species; a reproduction cutting, removing up to half the volume of the overstory; and a final clearcutting of the remaining mature stand. In

advance of the final cutting they recommend the "Fisher plan" of mowing the advance reproduction, but of commercial species only.

The weed species, such as dogwood, witch hazel, and hornbeam, they do not disturb, anticipating that the "rapid height growth of the new seedling sprouts should enable the latter to overtop the weeds in fairly short order." Particularly on good sites, however, the reproduction of commercial species will subsequently need help.

The authors emphasize the need for the forester to bide his time for several years after the final cutting before releasing the young growth, which should have reached a height of 8 or 10 feet before the machete or axe is used on the weeds. After any earlier cutting the sprouting weeds will again overtop the commercial species.

Throughout their discussion of reproduction cuttings, and a brief account of some plantations of both conifers and hardwoods on old fields, Tryon and Finn stress the need for as complete an understanding as possible of the fundamental ecology of the locality. The attempt to maintain planted conifers on heavy soils where (with the exception of hemlock) they never grew naturally, illustrates the blunders to be made without such understanding. Less obvious, but none the less actual, errors are inevitable if improvement cuttings are made without knowledge of the trends of natural succession. Some of the most stimulating portions of the bulletin are ecological discussions; one unique suggestion is that of a "successional rotation," or alternating occurrence of the white ash-red oak-red maple-tulip association and white oak-sugar maple-hemlock association.

The authors summarize previous fundamental studies of mycorrhizae and soils in a fashion very acceptable to those foresters who appreciate the value of such studies but find most accounts of them to be, in the late Austin Cary's dry characterization, "close reading."

In the extremely practical field of administration, the authors consider machinery to be the answer to the problems of woods labor; with its aid they expect that "the working day will be shorter, and daily wage and output far higher. The crew will not return home at night exhausted."

No one can read this progress report on twenty years of work in one forest without the determination to read, or re-read, more of the 14 bulletins and 23 papers that have emanated from Black Rock Forest. They have come from many pens. But all of the writers owe much to the keen mind and stimulating personality of Director Tryon.

R. D. FORBES.

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Minimum Areas for Different Vegetations: Their Determination from Species-Area Curves.

By Arthur G. Vestal. 129 pp. University of Illinois Press, Urbana. 1949. $2 (paper); $3 (cloth).

The treatise discusses a graphic method of expressing for any given plant community the relation of the number of different plant species encountered on a quadrat or sample plot that might be used in a survey of the community; thence, a method of comparing different plant communities with "given degree of informativeness."

In the case of a 1-acre sample plot, for instance, the number of different species might be listed according to certain subplots, such as the number in the first mil acre (0.001-acre), the number in the first 0.01-acre, and in the first 0.1-acre; and finally the number in the full acre. Number of species is then plotted against the logarithm of corresponding subplot or plot area; or against the area itself on the logarithmic scale of semi-logarithmic cross-section paper. The form of the free-hand curve fitted thereto seems to be invariably of the flattish S-type.

Two points along the curve are next selected, subject to the condition that the plot-area represented by the second point is just 50 times that of the first, and simultaneously, that the number of species represented by the second is exactly twice that of the first. The higher and lower areas are designated Af and Ar, to signify "fair-sized area" and "smallest representative area" respectively. Corresponding numbers of species are designated Sf and Sr. In the complete S-curve there can well be, as the author points out, two pairs of points that fulfill the condition imposed. When this happens, he chooses the higher pair. A third point along the curve is finally taken such that its abscissa, designated Am for "minimum area," is 5 Ar, its corresponding ordinate being designated Sm.

In characterizing a plant community, it is sufficient to give Am, say in mil acres, together with the numerical equivalents of Sr and Sm. Number of plants per acre should also be given as an aid in appraising reference areas and their species numbers.

These statistics are listed for each of 240 plant communities from many parts of the world, as collected by many different investigators. It is natural indeed that in order to put such varied material, taken in different ways and for different purposes, on a comparable basis, strong-arm schemes had sometimes to be used. Judging by the discussion, however, the required conversions were painstakingly performed.

A section of the treatise is given to the comparison of the Fisher series for estimating the relation of the number of species in a population to the number of individuals in a random sample thereof, and the species-area problem. The Fisher series is rejected as an expression of the species-area relation because it overestimates the number of species to be expected for a high number of individual plants (the equivalent of a large plot when plant-count rather than plot area is the independent

variable). Yet there is the statement (p. 15) that " . . . the author believes that Fisher's series, with its rational explanation of relation between numbers of species and numbers of individuals, is almost certainly the basis upon which additional characteristics of communities of rooted plants are superposed." And further (p. 16) that certain types of field data ". . . or even line surveys in vegetation, and aggregates of well-separated very small plots, are less refractory statistical materials, as far as amenability to treatment by Fisher's series is concerned, than are the progressively larger one-piece areas of rooted vegetation here dealt with."

In consequence of these statements, one wishes that, rather than reject the Fisher series, the author had rejected the notion that a one-piece sample plot, even when large, contains a satisfactory sample of the number of species in a plant community. The equivalent sample-plot area scattered over a large number of small plots would almost certainly provide better representation of the community; and if, in addition, the Fisher series fits such data adequately, as the author himself suggests, then the problem is completely solved.

F. X. SCHUMACHER,
Duke University.

Decay Resistance of Black Locust Heartwood.

By Theodore C. Scheffer and Henry Hopp. 37 pp. Illus. U.S. Dept. Agric. Tech. Bul. 984. 1949.

This bulletin records the techniques employed and the results obtained in testing the resistance of the heartwood of black locust (*Robinia pseudoacacia* L.) to the attack of two wood-rotting fungi, *Poria incrassata* (Berk. and Curt.) Burt and *Fomes rimosus* (Berk.) Cke., under carefully controlled laboratory conditions. The first fungus is known to cause decay in a variety of woods and the second is commonly associated with heart-rot in locust.

The material tested was obtained from forty-two trees cut on Long Island, N. Y. Thirty of the trees represented two strains that generally propagate vegetatively, namely shipmast and Flowerfield, both of which are reported to be very durable. The remaining trees originated from seed and were designated as common locust. Five stands were sampled for each of the three groups.

The extent of the decay taking place in the test blocks was measured by loss in weight. On this basis, the Flowerfield strain proved most durable, the shipmast somewhat less, and the common varities considerably less, although variation in the last group was much more pronounced than in the two vegetative forms. In general, the outer heartwood was found to be more durable than the inner; this characteristic, however, decreased vertically from the base of the tree. The outer heartwood of the larger trees was more durable than that of the smaller ones while in the latter, the inner heartwood was more resistant. Since the outer heartwood comprises more of the trunk volume, the larger trees produced more durable heartwood than did the smaller ones. However, this difference was slight.

In locust trees of equal diameter, the slower grown ones were somewhat more decay resistant than those of faster growth. In other words, the wood having the greater number of rings per inch and hence the lower specific gravity was more decay resistant on the average than the denser and more rapidly grown material. Decay resistance was also found to be closer associated with the hot-water extractives which were more potent in the newly formed outer heartwood than in the older portions nearer the pith.

The bulletin is well written and portrays the meticulous care with which the entire project was treated. Some readers who are less familiar with the application of modern statistical procedures employed in research may find certain portions of the work to be somewhat tedious. However, sufficient clarity has been maintained throughout by means of numerous graphs and charts.

Foresters and others interested in the growth and utilization of black locust will find the bulletin a welcome addition to the literature concerning this species. It is hoped that this work will also stimulate similar investigation into the decay resistance of other native commercial species.

NEWELL A. NORTON,
The Pennsylvania State College.

Woody-Plant Seed Manual.

Prepared by U.S. Forest Service. 416 pp. Illus. U. S. Dept. Agric. Misc. Pub. No. 654. 1948. $2.75.

Wise men of countless generations have marveled at the power packed beneath the cover of a tiny seed. Without the effort of thought, all men ate a few of the many kinds simply because they were good and satisfied their hunger. Some men comprehended the fact that a host of seeds were indirectly meat for mankind. Many, perhaps, were fascinated when they sensed a secret quietly and securely locked within every seed. Probably very few early men really looked at a seed and dreamed off and away from the gardens of sustenance to ponder the mystery of rebirth and perpetuation of all living things.

It is well that men have picked to pieces the tiniest of seeds, given names to all their parts, and succeeded in explaining the functions of each part. It may be even better that all of mankind has never been able to pry out the secret of why it grows.

Nearly all seeds can fulfill their purpose if given full opportunity. When men set out to assist, they often fail to give a seed a complete chance. They slip up somewhere in the sequence of proper harvesting, cleaning, curing, storing, and sowing. They break some rule of nature. The energetic little spark of life within the seed is doused. A tree has been killed in the seed.

That thought has stimulated the

U. S. Forest Service to compile a book which has been named *Woody-Plant Seed Manual*.

The introduction recognizes the tremendous quantity and cost of seeds required to restore appropriate woody plant cover on vast acreages of our land. It points to the need for more information on the whole subject of seed handling in getting this vast planting job done effectively and efficiently. The book marks a new width of coverage in its field, but does not fail to indicate a need for additional information based on both laboratory studies and field experiences.

The volume is divided into two parts, both of which are long. Part I presents an excellent review of flower and seed parts and their functions. Even those who have not opened a botany book since school days will find this part pleasant to read because the technical terms are cleared up for the reader as he moves along. Factors having to do with seed formation, ripening and dispersal are well presented. The importance of using superior races within tree species is stressed.

Toward the end of Part I, the manual gets down to the important business of harvesting, cleaning, and storage. Any forester engaged in these activities could not afford to miss reading this portion. Along with theories expounded on seed dormancy and methods of inducing germination, it admits much remains to be cleared up around these troublesome traps for the nurseryman. Paragraphs on seed testing and sowing rates tend to take the usual school book slant.

Happily there is a paragraph on interpretation of seed tests. In effect, it cites the fact that some weaklings are born to trees, and that storms, rodents, birds, insects, and diseases usually take their toll from seed and tender plants. It suggests the worth of an experience table for a given nursery as a guide in calculating probable tree survival. A careful reading of that portion should be helpful to those who overtrust book formulae in calculating seeding rates.

This manual is decidedly not provincial in subject coverage. Depending upon one's viewpoint, this could be good or bad. Part II gives detailed seed and seedling characteristics of many species which represent nearly all woody plants of America. It gives much other information based upon actual nursery experience.

With this volume at hand, nurserymen need no longer to feel they are advance scouts in the field of so-called wildlife stock production. The experience of waiting one or two years for some shrub seed to germinate in a bed should no longer be as common as it seemed to be in the Mid-Thirties.

Seed collectors, dealers, and users alike will find the *Woody-Plant Seed Manual* worth careful reading. Those who search for woody plants to fit some special use should give it their attention. Those who pursue knowledge with no direct occupational incentive will find the seed a fascinating subject and like this book. School libraries will find it an excellent reference.

TOM O. BRADLEY,
Soil Conservation Service.

The California Pine Region Forest Handbook.

By George A. Craig and William P. Maguire. 193 pp. Illus. Division of Forestry, California Department of Natural Resources, Sacramento. 1949. 50 cents.

California State Forester DeWitt Nelson explains in the forward of this attractive book that its purpose is to supplement the advisory service of the Division of Forestry's technical foresters in providing fundamental information to timber owners so they can practice good management of their forest lands. The handbook contains sufficient general informational material and specific tabular data that its value to a land-owner cannot be questioned. Professional foresters in California will probably find that they cannot afford to do without it, either, although some parts are elementary.

Discussions of cruising, cutting methods, scaling, road construction, forest protection, and basic information on tree structure and growth are included, as well as descriptions of forest products and information on how sales can be made, including a sample timber sale agreement.

A brief chapter on management methods applicable on intermingled forest range types points out another source of income to the forest manager.

Sixty-six tables give valuable information not readily available to a timber operator. These include volume tables, log rules, double bark thickness at 16 feet, growth rates, harvesting ages for managed saw-timber by sites, log weights, indicator plants, and many others.

All of the material presented will not be usable (and some may not be understood) by any one timber owner, but every timber owner will benefit by having and using the handbook.

ROBERT D. HOSTETTER.

Current Literature

Compiled by MARTHA MEELIG, *Librarian*
The New York State College of Forestry

Range Management Section Compiled by
FRANCES FLICK, *Library, U. S. Department of Agriculture*

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Culbin Forest. 15 pp. Illus. Great Britain Forestry Commission, London. 1949. Sixpence (H.M. Sta. Off.)

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The Ohio. By R. E. Banta. Illus. Rinehart, New York 16. Rivers of America Ser. $5.

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Manual of Timber Management. Pts. 1 & Suppl. 1949 to 5. Ontario Department of Lands and Forests, Toronto. 1948. $1 per set.

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Forest Areas in Pennsylvania. 69 pp. Illus. Pennsylvania Department of Forests & Waters, Harrisburg. 1948.

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List of Canadian Sawmills. Dominion Forest Serv., Ottawa. 1949. $3.

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A Preliminary Guide for Range Reseeding in Arizona and New Mexico. By H. G. Reynolds, and others. 12 pp. U. S. Forest Serv., Southwestern Forest and Range Expt. Sta., Tucson, Ariz. Research Rpt. No. 7. July 1949.

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Woody-Plant Seed Manual. By U. S. Forest Service. 416 pp. Illus. U. S. Dept. of Agriculture. 1949. Misc. Pub. No. 654. $2.75 (Govt. Print. Off.)

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A Simple Soil Sampler and Its Use as a Permeameter. By R. N. Gaiser. 3 pp. Illus. Central States Forest Expt. Sta., Columbus 15. 1949. Technical Paper No. 112. Mimeog.

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Employment in the Building Trades. 121 pp. U. S. Dept. of Labor, Washington 25, D. C. 1949. Bul. No. 967. 50 cents (Govt. Print. Off.)

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Society Affairs

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Albert G. Hall Named Editor of Society Publications

With the unanimous approval of the Council Albert G. Hall, a professional forester with considerable writing and editorial experience, was appointed editor of Society publications, effective January 2.

A native of Pennsylvania, aged 38, Mr. Hall was graduated in forestry at Penn State in 1933. Following a brief period doing writing and editing for the Pennsylvania Department of Forests and Waters, he entered the Civilian Conservation Corps in a field position. Later assigned to the Washington, D. C. office as a training officer, he helped develop training courses and wrote bulletins and similar publications. He is co-author of the book *C.C.C. Forestry*.

Transferred in 1940 to Region 7 (Northeastern) of the U. S. Forest Service for training duties, he continued in that position until May 1943 when he was appointed to the War Production Board's Lumber and Lumber Products Division. Following the war, he became assistant, later associate, editor of *American Forests* magazine, and subsequently was named forester for the American Forestry Association.

ALBERT G. HALL

A full Member of the Society, he is a former chairman of the Washington Section.

Need for an Editor

The need for a paid editor for the Society was first outlined by the executive secretary in his annual report of 1946. (See Journal of Forestry for November 1946.) However, because of lack of funds it was not possible to fill the position, though the need for a paid editor became more and more insistent.

In June 1948 at its midyear meeting the Council adopted the following policy statement with respect to an editor, and reaffirmed the statement in June 1949. (See Journal of Forestry for August 1949, page 677.)

> The Council approves the establishment of a staff office on publications with qualified personnel, as the next major expansion of the annual budget. It should be the function of this office to conduct the editorial work and business management of the JOURNAL OF FORESTRY and *Forestry News;* and to handle the publication and distribution of such other publications as the Society may undertake from time to time.
>
> Pending the establishment of this office, the Council requests the editorial board and officers of the JOURNAL OF FORESTRY to put into effect such improvements in the JOURNAL and increased advertising as they find practicable within the present budget.

When Hardy L. Shirley resigned in March 1949 as editor-in-chief of the Journal of Forestry, he reported to the Council that "The job represents at least one-half time work of a full-time employee."

But in addition to editing the Journal, there are other editorial functions to be performed for the Society. Among the publications authorized by the Council and requiring expert editorial work are the following:

1. The fifty-year *History of Forestry* to be published this year.

2. The revised *Forestry Terminology* now in process of publication.

3. Combined eastern and western

Forest Cover Types of the United States and Canada.

4. *The Foresters' Field Manual* now in process of compilation.

5. The Society's *Directory of Members.*

6. The revised *Constitution and Bylaws.*

7. A book length report on research techniques in forest economics, a joint project of the Society and the Charles Lathrop Pack Forestry Foundation, now in preparation by a committee of the Division of Forest Economics.

8. *Grade Standards for Forest Planting Stock*, in preparation by a special Society committee.

9. Revision of the old (1939) style manual for the Journal of Forestry, long out of print.

Arrangement with Mr. Hall

Although Mr. Hall works for the Society on a salary he is not employed on a full-time basis. As editor he devotes 75 percent of his time to the Society and the remaining 25 percent he spends on other professional activities not connected with the Society.

In addition to routine editorial duties, Mr. Hall will later undertake the development of revenue producing activities and of eastern advertising contacts, supplementing the activities of Lloyd Thorpe, advertising representative at Seattle.

The action by the Council in providing for a "staff office on publications" contemplated that it would be a unit of the executive office under the supervision of the executive secretary and in accordance with Council policies and the Society's Constitution.

In employing Mr. Hall, the Society will not expand further. Because of limited finances, no additional employees will be added to the office staff. The associate editors will continue to function as they have in the past.

A bylaw of the Society provides that the executive secretary may be appointed managing editor of the Journal. Accordingly, Henry Clepper, who has served as managing editor since 1937, will continue performing the functions inherent in that title. Miss L. A. Warren will continue as business manager, handling the numerous and expanding business matters which she has ably handled for many years, not alone for the Journal but for the whole Society.

The retiring Council which took action on this appointment (as of December 15, 1949) during the last month of its term of office, authorized Mr. Hall's appointment on the customary six-month probationary basis. The present Council will review the editor's accomplishments in the light of the Society's financial prospects to determine whether the arrangement shall be continued.

Comment by Dr. Schmitz

The Society of American Foresters soon will be fifty years old. These have been years of growth and achievement. From a handful of foresters who met from time to time, the Society has grown to be one of the largest and most influential groups of professional foresters in the world, with its own offices, an office staff, and executive secretary, and its own publication, the Journal of Forestry.

The Society now has taken another step forward: the employment of a paid editor. There probably are some members who believe this is an unnecessary and expensive step. There probably were some who believed the renting of offices, the employment of an executive secretary, and the publication of a monthly journal were unnecessary and expensive steps. But who now would argue the wisdom of these actions? I think, therefore, the employment of a paid editor is an inevitable and necessary step in the ever growing services the Society renders the nation, the profession, and its members.

Since the day of its founding, the Society has always been virile and dynamic. It has always met, and I hope will continue to meet, new demands and responsibilities in its own professional area. We shall never reach the end. The employment of a paid editor is merely another milestone in the path of progress of the Society.

I congratulate the Society on its good fortune in securing Albert G. Hall to fill this important post. His training and experience, both in forestry and in editorial work, insure his success. Under his leadership the Journal will, I am sure, grow in value, in service, and in prestige.

HENRY SCHMITZ,
Editor 1937-1941.

Comment by Dr. Shirley

I wish to commend the Council for their wisdom in employing a paid editor for the JOURNAL OF FORESTRY. It is a step that has long been needed and marks an important stage in the maturity of our Society.

Perhaps no one realizes better than a past editor the shortcomings of a voluntary editor. He enters on his duties with high hopes of making the JOURNAL interesting, readable, and up to the minute. However, before he has been on the job more than two or three months, he becomes so bogged down with the never-ending details of receiving and recording manuscripts, referring them to associate editors, corresponding with authors about changes, editing the manuscripts for clearness of expression and good English usage that he finds little time to give the JOURNAL that imaginative leadership the Society has a right to expect.

But there is a more important reason for having a paid editor. No one can accept the job as editor on a voluntary basis unless the agency for which he works is willing that he devote a considerable proportion of his energies to editing the JOURNAL and is willing to make available to him either on a compensated or uncompensated basis the services of a competent secretary. Without such services, it would have been impossible for me to edit the JOURNAL.

When I discussed resigning the editorship with Dean Illick he very kindly and tolerantly expressed his feeling on the matter somewhat as follows, "I think you have personally met this obligation for a generous period of time and deserve relief, and I think the college

also deserves to be relieved of this burden."

I am sure that there are plenty of other men in the profession who would be willing to serve a period as editor on a voluntary basis. There must also be other agencies equally as willing to have their employees serve. But we must realize that the responsibility is a growing one, both in volume of manuscripts and in diversity of field to be covered.

Several men have suggested that the Society might look to one of its retired members to assume the editorial duties. We have among the retired members many men of broad experience and background, mature judgment, excellent literary skill, and broad faith in our profession. But, to expect a retired member to carry this burden, without the support of a vigorous organization having splendid secretarial talent at his disposal as well as competent specialists in various fields of forestry to whom he can turn for advice at frequent intervals, is to expect too much. Our profession is highly dynamic. What was true of its character ten years ago, five years ago, or even three years ago, may not be true today. Only the men who are serving actively in the profession and are acquainted with the problems as they arise on a day-by-day basis can be expected to hold the interest and support of our JOURNAL readers.

I am very happy, indeed, that the associate editors are continuing to serve because without their extremely valuable contribution the editor would be virtually helpless.

Albert G. Hall is a splendid choice to edit our JOURNAL and I personally wish him every success in this challenging venture.

HARDY L. SHIRLEY,
Editor 1946-1948.

Directory Compilation Begins

Another Society project for the benefit of its members is getting underway this month. A directory of all members is being compiled and will be issued about the middle of 1950, the Society's Anniversary year.

The directory, which as well as names and addresses, will include positions, employers, collegiate degrees, and grades of membership will have many useful purposes. It will enable members to relocate former classmates and acquaintances. It will be a handy reference for business affiliation and addresses. It will be recognition to those forest industries and agencies that employ foresters. It will bring the professional records on file in the Society office up to date.

Reply cards, on which the return postage has already been paid, are being mailed this month to all Society members, with the request that they be completed and dropped into a mailbox promptly. By actual timing only 52 seconds are required to fill in the few blanks on the card.

The cards will be filed with each member's records after the information has been sent to the printer, so it is important for every member to cooperate in the project. Incidentally, the use of lengthy, 4-page "Record of Member" forms is being discontinued, but those few now on file will be retained, though out of date.

Information for the directory is being requested at this time rather than with the purchasing power and employment classification questionnaire which was issued last month in order to avoid confusion of the two projects, both of which are essential to effective operation of the Society.

Encourage all S.A.F. members of your acquaintance to return their directory cards promptly—and purchasing power questionnaires, too, if they have not already been returned—so that a 100 percent response can be ensured.

Referendum on Federal Forest Regulation Requested by Petition

The following petition, signed by 167 voting members, was received September 24, 1949 in the executive office of the Society from H. H. Chapman.

Whereas, the Society's Council adopted a statement on public regulation, which was published in S.A.F. Affairs April 1941, page 34, and in the Journal of Forestry Vol. 41:541, 1943, and was adopted by referendum vote issued September 11, 1944. Affirmative 1495 votes, negative 275 votes (Journal of Forestry 42:934), but was not at that time republished, and

Whereas, under this statement and referendum the Society's membership has not expressed its opinion, either through the Council or by referendum, on the question as to whether public regulation of private forests should be enforced directly by the Federal Government, or left to the states, and

Whereas, the Council policy and referendum above published includes the statement:

This statement of the Council's position must not be interpreted as endorsement now or later of any bill which may be introduced.

We urge the members of the Society to scrutinize carefully and be prepared to criticize constructively all legislation proposed in order that our profession may contribute to the fullest its knowledge and experience.

Whereas, President Clyde S. Martin on June 29, 1949 in letter to H. H. Chapman reiterates the position of the Council as quoted above, to the effect that he would personally oppose either Council action or a referendum on any specific legislation, and

Whereas, S. 1820, introduced by ex-Secretary of Agriculture Anderson, now Senator from New Mexico, with the approval of the U. S. Forest Service, would establish the principle of direct federal regulation of private owners, unless states within 3 years pass legislation in form acceptable to the Department of Agriculture; under threat and power of withdrawing all appropriations for this or *any other forestry program or other program related to the purposes of this act* (Sec. 5), and

Whereas, individual action by foresters as advocated by the Council on specific legislation is ineffective in recording the position of the members of the Society on the question of federal versus state regulation, we therefore petition the Council to submit a referendum in the following form:

Shall the Society of American Foresters through its Council favor or oppose the principle of federal regulation of private forests, and federal legislation looking to the establishment of this principle?

The Council's Proposal

On September 27, 1949 the petition was forwarded to the Council, and scheduled for the agenda of the Council's meeting to be held October 10 in Seattle.

Prior to taking final action, however, the Council requested an expression of membership opinion at the joint meeting of the Section delegates with the Council on October 10, and at the Society Affairs session on October 11. The ques-

tion propounded was: Should the Society hold referenda on specific legislation or on principles?

Guided by expressions of members present at the annual meeting, the Council on motion of Mr. Evans, seconded by Col. Greeley, established the following policy:

The Society Council has received a petition from a group of members, which requests a referendum on the principle of federal regulation, as expressed in the pending Anderson Bill, S. 1820.

The Council is opposed to referenda referring to specific legislative proposals. They often include different items which cannot be dealt with by a single overall vote. Furthermore, bills are so frequently amended, from stage to stage, that a referendum may quickly become out of date and be no longer applicable to amend bills or similar bills introduced later.

The Council is convinced that referenda in this field should deal only with basic policies, but they should include sufficient detail to cover adequately the current developments in national discussion and proposed legislation. The Society should determine its attitude on public control of private forest practices in a form more specific than the policy statement adopted in 1941.

It was the consensus of the Council that any explanatory material in the JOURNAL OF FORESTRY, or with a referendum, should emphasize the Society's concern with broad principles and not specific legislation.

In considering the petition as submitted, the Council on motion of Mr. Nelson, seconded by Mr. Evans, instructed the executive secretary to write direct to the petitioners about the discussion at the annual meeting and of the subsequent action of the Council; and to submit to the petitioners a suggested modification of their petition.

Alternate Referendum

In accordance with the foregoing decision, the Council directed that a letter be sent to each of the 167 signers of the original petition, asking each petitioner to indicate whether he was agreeable to substituting, for the referendum requested, a referendum on the following five propositions. This alternate referendum was submitted to the petitioners on October 31; they were asked to notify the Society on or before November 30 which of the two proposed referenda they approved.

1. Do you believe there should be any legal public controls over private forest practices? (Yes or No.)

2. Do you believe that controls of private forest practices should be effected under (vote for one):
   A. State legislation exclusively?
   B. Federal legislation?
   C. Some combination of state and federal legislation?

3. Do you believe that the adequacy of rules of cutting practice on private forest lands should be finally approved by (vote for one):
   A. A local unit within the state?
   B. A state agency?
   C. A federal agency?

4. Do you believe that a federal agency should be authorized to withhold federal financial cooperation under other forest programs from states:
   A. Whose legal controls or systems of dealing with private forest practices do not meet federal requirements? (Yes or No.)
   B. Which fail to carry out satisfactorily plans of control previously approved and accepted by the federal agency? (Yes or No.)

5. Do you believe a federal agency should be authorized to enforce prescribed forest practices directly on private land in any state:
   A. Which requests such enforcement? (Yes or No.)
   B. In which, after reasonable notice and trial, the performance of the state in the adoption of legal controls or in their enforcement is not satisfactory to the federal agency? (Yes or No.)

Substitute Rejected

As of November 30, 68 members voted for the referendum in the form as stated in the original petition; 46 members voted for the referendum in the form proposed by the Council.

Although Article VII, Section 3 of the Constitution was amended by vote of the membership on December 10, 1949, the provision in force at the time the petition was submitted as follows: ". . . Any action of the Council may be brought before the Society at large on written petition of not less than fifty voting members." The required number of members is on record as requesting the original form of referendum.

According to Bylaw 54, ballots for a referendum authorized by the Council as the result of a petition may not legally be mailed to the voters until the members receive at least two issues of the JOURNAL subsequent to the original publication of the proposals.

The petition has been published in this issue, which constitutes original publication as required by Bylaw 54.

April is the earliest month in which ballots may be mailed to the voting membership. The subject is now open for further discussion.

Correspondence about the O & C Referendum

In accordance with instructions issued by the Council, the following letter was sent to the Secretary of the Interior, the Secretary of Agriculture, and the members of the Senate Committee of Interior and Insular Affairs.

October 31, 1949

The Secretary,
Department of the Interior,
Washington 25, D. C.
Dear Sir:

The Society of American Foresters, a national organization of technically and professionally trained foresters, is vitally interested in the sound management of publicly owned timberlands.

Section 1 of Senate Bill 580 of the 80th Congress and its successor S. 148 of the 81st Congress would transfer to the Department of the Interior the administrative jurisdiction of some 462,000 acres of controverted land, now administered by the Department of Agriculture under agreement between the two departments.

A referendum was recently held by letter ballot of the membership of the Society, on the question of whether the proposed transfer would be in the public interest. You may be interested to know that a substantial majority of those voting disapprove of the proposed transfer.

Yours truly,
HENRY CLEPPER,
Executive Secretary.

In reply the following letter was received from the Secretary of the Interior.

December 6, 1949

My dear Mr. Clepper:

I appreciate your letter of October 31, 1949 advising me of the outcome of your referendum on S. 148. Your reference to that bill as a proposal to "transfer" jurisdiction of 462,000 acres from the Department of Agriculture to the Department of the Interior is noted.

Since the Oregon and California Railroad grant lands were restored to Government ownership there has been a difference of opinion regarding the jurisdictional effect of certain language used in the Revestment Act of 1916 as it relates to the 462,000 acres. S. 148 recognizes the cause of the existing uncertainty and proposes to remedy it by stating that the authority of the Secretary of the Interior shall be deemed to extend to these lands the same as to other portions of the revested grant lands. It is evident, therefore, that the jurisdictional question has never been resolved.

In view of these circumstances, the explanation of the bill to your membership as being intended to effect a trans-

fer of jurisdiction is considered inaccurate and misleading. Many members of the Society of American Foresters may have been misled by that language and their votes influenced accordingly.

S. 148 includes a plan whereby the 462,000 acres, plus approximately another one-half million acres of the O & C lands, which likewise are intermingled with national forest lands, may be concentrated in solid blocks for more efficient management. This would result in a similar concentration of approximately a million acres of national forest in solid blocks for more effective management. Both jurisdictions would benefit by this plan and the public interest would be furthered. This proposal appears to be entirely consistent with the interest of the Society of American Foresters in sound management of publicly owned timberlands.

You state that "A substantial majority of those voting disapprove of the proposed transfer." I would appreciate further details concerning the voting record showing specifically:

1. The total membership of your Society.

2. The total number who voted on the referendum.

3. The number who voted disapproval.

4. The number of votes cast by members who are affiliated with the Columbia River section of your Society.

5. The number voting disapproval who are affiliated with the Columbia River section.

Sincerely yours,
OSCAR L. CHAPMAN,
Secretary of the Interior.

In reply, the executive secretary wrote to the Secretary of the Interior as follows:

December 8, 1949.

Hon. Oscar L. Chapman,
U. S. Department of the Interior,
Washington 25, D. C.
Dear Mr. Secretary:

This will acknowledge receipt of your letter of December 6 with respect to the referendum held by the Society of American Foresters, about which I wrote you on October 31.

At the conclusion of your letter you asked five questions which I shall answer seriatim.

1. The total *voting* membership of the Society, as of November 1949, was 5,789.

2. The total number of *valid* ballots cast in this referendum was 2,563.

3. The vote was as follows: approving transfer of the 462,000 acres of controverted land from the Department of Agriculture to the Department of the Interior, 558; disapproving the transfer, 2,005.

4. The number of votes cast by members who are affiliated with the Columbia River Section is not known. All our elections and referenda are by secret ballot.

5. The number voting disapproval who are affiliated with the Columbia River Section is not known for the reason given in 4 above.

Cordially yours,
HENRY CLEPPER,
Executive Secretary.

Post Office Department Requested to Issue Pinchot Commemorative Stamp

Dated November 23, 1949 the following letter was sent to the Postmaster General by George A. Duthie, chairman of a committee which has requested that the Post Office Department issue a special Pinchot commemorative stamp during 1950.

I am writing you in behalf of the Society of American Foresters to request the issuance of a commemorative postage stamp in honor of Gifford Pinchot. Since Mr. Pinchot's death in 1946 this action has been urged repeatedly by members of the Society throughout the country. On November 21, a committee of Society members, consisting of Ovid Butler, representing the American Forestry Association, Henry Clepper, executive secretary of the Society of American Foresters, Richard P. McArdle of the U. S. Forest Service, Newton Drury, chief, National Park Service, and the undersigned, called upon Robert E. Fellers, deputy assistant postmaster general, and presented a request for the issue which he said would be transmitted to your office.

Gifford Pinchot was the pioneer conservationist. More than any other person he was responsible for the initiation and the development of the movement for conservation of the natural resources. Through this movement he made a lasting contribution to the American economy and way of life. In this he rendered this nation an inestimable service.

Gifford Pinchot was one of the founders of the Society of American Foresters, the national professional society of foresters. Many of its early meetings were held in the Pinchot home in Washington, and it was there that Theodore Roosevelt, an Honorary Member of the Society, attended one or more of its meetings while he was President of the United States. President Franklin D. Roosevelt, also an Honorary Member of the Society, was awarded the Society's Schlich Medal for outstanding achievement in conservation.

In late 1950 the Society will observe its fiftieth anniversary, which will be celebrated by a national meeting on December 14-16, 1950, in Washington, D. C. This will be an appropriate moment for issuance of the stamp. It would serve to enhance public interest in the cause of conservation and at the same time memorialize the man who was so largely responsible for it.

We therefore urge the approval of this postal issue for release on an appropriate date in 1950.

Washington Section Meets: Mrs. Roosevelt Speaker

The Washington Section held its annual ladies' meeting on December 19 in the YWCA in Washington, D. C. It was a luncheon meeting with Mrs. Eleanor Roosevelt as the principal speaker and Mrs. Gifford Pinchot as guest of honor.

More than 200 members, their ladies, and guests were present. Arthur M. Sowder, Section chairman, presided.

Mrs. Roosevelt was introduced by Lyle F. Watts, chief of the Forest Service, who reminded the members that Franklin Delano Roosevelt, elected an Associate Member of the Society in 1932, and an Honorary Member in 1934, had been an S.A.F. member for 13 years.

Although Mrs. Roosevelt spoke engagingly of Mr. Roosevelt's interest in forestry and conservation, and mentioned some of the challenging soil and water conservation problems facing the world, it was in connection with the work of the United Nations that most of her remarks were directed.

There were door prizes of holly, small yule logs, and Christmas trees for the ladies including a Christmas tree from the Hyde Park plantations.

Two Chapters Study Student Affiliation

Committees in two Chapters are now studying ways in which forestry school students and organizations might be affiliated with the Society of American Foresters.

Archie E. Patterson and A. C. Worrell of the Georgia Chapter, Southeastern Section, and C. O. Minor, George Stevenson, and Louis Grosenbaugh of the Florida Parishes Group, Gulf States Section, are investigating several proposals that would enable the Society to render greater service to forestry students in coordinating their collegiate training with employment demands and post graduate development.

Following presentation of the subject by the Georgia Chapter to the Forestry Club and Xi Sigma Pi at the University of Georgia, the students came to the conclusion that provision for a Student Member grade in the Society was a logical forerunner of the establishment of Student Branches.

Southern Minnesota Chapter Holds Fall Meeting

On the evening of November 23, 1949, the Southern Minnesota Chapter, Upper Mississippi Valley Section, held its fall meeting at the University of Minnesota Union lounge. Ladies were invited to this meeting at which Clarence D. Chase, Chapter chairman, presided.

Both Mr. and Mrs. Joseph H. Stoeckeler spoke at the meeting describing the forestry and art of Europe, along with other highlights of their recent trip. Mr. Stoeckeler attended the forestry conference at Helsinki, Finland, after which he and Mrs. Stoeckeler, who is an artist, traveled through most of the European countries west of the Iron Curtain. Their talks and the accompanying Kodachromes proved both interesting and instructive.

Longleaf Group Meets

Randle J. Dedeaux, consulting forester of Perkinston, Miss., was elected chairman of the Longleaf group of the Gulf States Section of the Society of American Foresters, in a meeting held in Hattiesburg, Miss. on December 9.

Other officers elected for 1950 were Louis E. Dantzler, forester with International Paper Co., Pascagoula, Miss., vice chairman; and John G. Guthrie, forester, Illinois Central Railroad, Hattiesburg, Miss., secretary-treasurer.

Retiring officers are: chairman, T. E. Maki, director of the Gulf Coast Branch of the Southern Forest Experiment Station, Gulfport, Miss.; and secretary-treasurer Edwin Ferguson, superintendent of the Harrison Experimental Forest, Saucier, Miss.

Nearly fifty foresters from all parts of southern Mississippi heard Congressman W. M. Colmer, from Mississippi's sixth congressional district, talk to them about congressional activity.

The next meeting of the group will be at Biloxi, Miss. on February 10, 1950.

Columbia River Section Hears Harris Ellsworth

Over 300 foresters attending the Fortieth Annual Meeting of the Western Forestry and Conservation Association gathered for a dinner meeting of the Columbia River Section at the Multnomah Hotel in Portland, Ore. on December 8. Ernest Kolbe is Chairman of the Section. In addition to members of the Columbia River Section, guests from several other Society Sections were also present. These included members of the Puget Sound, Inland Empire, Northern California, Northern Rocky Mountain, Central Rocky Mountain, and some of the eastern Sections.

Oregon's Congressman Harris Ellsworth was the guest speaker at the meeting. He directed his remarks principally in opposition to further extension of federal regulation. He was introduced by W. D. Hagenstein, forest engineer on the Forest Conservation Committee of Pacific Northwest Forest Industries, who pointed out that the Congressman was from Roseburg, in Douglas County, Oregon, the county which has the largest stand of timber in the United States.

Coming Events

Southern Agricultural Workers

The Association of Southern Agricultural Workers will hold its annual meeting at the Hotel Buena Vista, Biloxi, Miss., February 9-11.

There will be meetings of the association's Forestry Section on each of the three days. The chairman of the Forestry Section is Dean D. J. Weddell of the University of Georgia, School of Forestry, Athens, Ga.

Allegheny Section

The Allegheny Section will hold its 28th annual winter meeting at the Warwick Hotel, Philadelphia, Pa., February 15-17.

Chairman for the meeting is George R. Moorhead, 416 State House Annex, Trenton, N. J.

Southern Forestry Conference

The Southern Forestry Conference, held annually by the Forest Farmers' Association Cooperative, is scheduled for the George Washington Hotel, Jacksonville, Fla., February 17 and 18.

The secretary of the cooperative is Paul Schoen, Valdosta, Ga.

Shade Tree Conference

The fifth annual meeting of the Midwestern Chapter of the National Shade Tree Conference will be held February 15-17 at the La Salle Hotel, Chicago, Ill. The meeting is open to all persons interested in trees.

Problems of concern to arborists, particularly to those located in the midwestern region, will be discussed by able speakers. Officers for the ensuing year will be selected at the business session Thursday afternoon. Members of the National Arborist Association, Inc. who are present at the conference will hold a luncheon meeting Thursday noon.

Chairman of the local committee for the conference is Noel B. Wysong, Cook County Forest Preserve, 536 North Harlem Avenue, River Forest, Ill.

New England Section

The annual winter meeting of the New England Section will be held February 23 and 24 at the Hotel Somerset, Boston.

The Section chairman is L. C. Swain, Department of Forestry, University of New Hampshire, Durham, N. H.

Inland Empire Section

A meeting of the Inland Empire Section will be in Moscow, Idaho, on March 4. The forestry students of Washington State College and the University of Idaho have arranged the program.

The Section chairman is A. B. Curtis, Orofino, Idaho.

15th Wildlife Conference

The 15th North American Wildlife Conference will be held at the Fairmount Hotel, San Francisco, March 6-8.

During the course of the conference there will be a special meeting of the Society of American Foresters Division of Forest-Wildlife Management. The Division chairman is Fred P. Cronemiller, U. S. Forest Service, 630 Sansome Street, San Francisco 11, Calif.

Elections to Membership

Affiliate

Dennis, E. E., Fla.
Dubreuil, R. F., Conn.
Holmes, O. L., Calif.

Associate

Martin, H. C., La.

Junior

Allen, B. L., N. C.
Anderson, W. C., Pa.
Attaway, C. F., Ala.
Attaway, H. B., Fla.
Barnes, C. S., Ga.
Barnett, S., Idaho
Berger, J. W., N. Y.
Boswell, A. W., N. C.
Bowser, C. R., Ind.
Braithwaite, E. G., Utah
Brown, C. L., Ga.
Brown, J. H., Mich.
Brown, O. W., N. Y.
Buchholz, J. A., Ky.
Burlison, V. H., Idaho
Burns, R. L., Ill.
Carey, R. E., Ariz.
Colton, G. M., Utah
Castonguay, M. L., Wis.
Chapman, W. L., Ga.
Cloud, M. C., Jr., W. Va.
Faurot, J. L., Mont.
Fiske, L. M., Jr., Mass.
Fluckiger, D. T., Wyo.
Frisby, W. E., Utah
Fry, G. B., Utah
Gandy, J. A., Ga.
Garland, W. M., Fla.
Greer, E. S., Ga.
Griffin, E. C., Fla.
Hanson, J. W., Ga.
Hickman, R. D., Ariz.
Howell, W. E., S. C.
Jordan, W. R., Wis.
Kent, B. F., Ill.
Knight, V. J., Ga.
Koch, C. B., Idaho
Lindgren, A. H., Fla.
Madden, T. M., Utah
Maddox, J. W., Mo.
Malcneik, W. C., Colo.
Marshall, P. E., Me.
Marshburn, W. J., Jr., N. C.
Millar, R. R., Calif.
Miller, J. E., Ala.
O'Neal, R. E., Iowa
Palmer, A. N., Idaho
Pearson, M. W., Mo.
Pekar, M. A., Conn.
Powers, L. M., Fla.
Richards, D. L., Ill.
Riddagh, D. W., Wash.
Robertson, R. R., Miss.
Saltsman, J. L., Mont.
Sandretto, R. P., Wis.
Schmitt, D. M., Ill.
Schuft, P. H., Ariz.
Sebring, P. E., S. C.
Shone, R. T., N. Y.
Shopton, G. C., Ga.
Shreve, E. P., W. Va.
Solow, R. L., N. H.
Striplin, H. A., Calif.
Tomlinson, R. V., Ark.
Underwood, N. B., Wis.
Van Matre, H. R., Ind.
Veenschoten, J. C., Pa.
Wade, I. W., Mass.
Ward, J. R., S. C.
Whipple, E. L., N. D.
Wightman, M. D., Utah
Zurney, W. E., Pa.

Member

Abbott, R. W., Wis.
Allison, A. C., W. Va.
Anderson, A. K., Minn.
Augustine, M. T., Md.
Bennett, W. A., Wash.
Berry, F. H., Ariz.
Blocker, N. B., Fla.
Boerner, W. R., Minn.
Bowen, R. O., W. Va.
Brands, A., N. H.
Breckenridge, P. D., Ga.
Brinkman, K. A., Iowa
Bryden, C. M., Wash.
Buell, E., Wash.
Bunnell, R. G., Conn.
Butz, J. A., Fla.
Cameron, J. G., Wash.
Carr, E. T., Ariz.
Catlow, W. V., Wash.
Childs, J. K., Minn.
Clark, F. F., Jr., Fla.
Codman, W. S., N. H.
Corson, K. P., Wash.
Cranch, R. C., Conn.
Cranston, W. V., Ala.
Curtin, G. D., W. Va.
DesCamp, R. M., Wash.
Dolence, F. L., Minn.
Donaldson, D. W., Wash.
Dressel, Elvin, N. Dak.
Dunham, C. B., Can.
Durfee, H. A., Wash.
Dyer, C. D., Ga.
Felton, P. M., Pa.
Fisher, J. N., Wis.
Forder, M. H., Minn.
German, G. M., Pa.
Getty, R. E., Iowa
Gillis, J. R., Wash.
Granson, J. E., Iowa
Haigh, T. W., N. J.
Hall, W., Jr., Wash.
Helgeson, R. G., Wash.
Hicks, V. E., Wash.
Hodgkins, P. M., N. H.
Holl, C., Wash.
Holloway, G. E., Wash.
Homolac, H. L., Wash.
Ilg, Robert L., Wis.
Ingling, C. R., Md.
Jensen, R. H., Minn.
Joyer, V. J., Alaska
Kajander, R. W., Minn.
Kuehlke, C. G., Conn.
Kukachka, B. F., Wis.
Kulp, J. W., Wis.
Leavitt, A. S., Minn.
Liesch, J. E., Can.
Ludwig, W. D., Jr., Pa.
Magelssen, M. W., Wash.
Marks, E. R., Idaho
Marra, G., W. Va.
Mather, D. W., Fla.
McCormick, H. F., Wash.
McFarland, T. A., Ga.
Mignery, A. L., Tex.
Miles, E. W., Ohio
Mitchell, J. R., Wash.
Moisio, W. J., Wash.
Morgan, H. H., Pa.
Morganroth, E. S., Wash.
Morley, R. M., Minn.
Nagle, W. B., Fla.
Nermoe, R. C., N. Dak.
Neumen, F. W., Wash.
Nyberg, H., Wash.
Olson, A. R., Conn.
Olson, S. R., Minn.
Owens, J. W., Jr., Ala.
Park, R. B., Jr., Conn.
Patton, R. F., Wis.
Pearson, C. H., Wash.
Peltier, E. W., Wash.
Pelto, W. E., Wash.
Peter, R. K., Wash.
Petzold, A. O., Wash.
Pierce, D. V., Minn.
Pierce, W. R., Mont.
Post, H. A., Minn.
Raubach, R. T., Wash.
Roller, H. M., Jr., Fla.
Rouse, C. H., Ore.
Rummell, R. S., Wash.
Sanders, R. D., Minn.
Saterbo, B. C., Wash.
Settergren, R. G., Minn.
Smalley, F. E., Vt.
Smith, E. W., Idaho
Smyth, A. V., Wash.
Soderlind, D. R., Wash.
Spratt, J. R., Fla.
Springer, J. B., Canada
Stabler, F. E., Ga.
Staebler, G., Wash.
Stephens, T. K., Canada
Stewart, Alban, Fla.
Stiehl, J. H., Ill.
Stravinski, C., Md.
Thomson, F. M., Wash.
Touzeau, E. G., Can.
Trust, Jack, Wis.
Turner, F. J., Vt.
Vanden Oever, E. H., Wash.
Vogler, A. H., Pa.
Wagner, S. R., Pa.
Weaver, L. J., Ala.
Weber, L. S., Ill.
Wehrle, A. A., Wash.
Weil, E. H., Jr., Ariz.
Weitzman, S., W. Va.
Wellwood, R. W., Can.
Welton, W. H., Idaho
Weswig, C. O., Wash.
Wick, P. N., Wash.
Wilkinson, J. E., Jr., Vt.
Williams, G. B., Ga.
Williams, H. E., Ga.
Wilson, D. W., Wash.
Wood, W. R., Wash.
Wright, T. G., Can.
Wycoff, H., Ill.
Wyman, M. H., Wash.
Young, R. N., Wash.

Corresponding

Tejeda, Ricardo, N. Mex.

Reinstated
Junior

Haigh, W. S., Fla.
Johnson, H. G., Ariz.
Tribbett, V. A., D. C.

Member

Hyde, G. R., N. H.
Rawie, C. D., Ariz.

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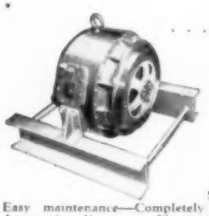

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Announcement of Candidates for Membership

The following names of candidates for membership are referred to the membership for comment or protest. The list includes all nominations received since the publication of the January JOURNAL without question as to eligibility. Names, addresses, education, and endorsements are given. The names have not been passed upon by the Council. Important information regarding the qualifications on any candidate which will enable the Council to take final action with a knowledge of essential facts should be submitted before March 15, 1950. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered as strictly confidential.

Allegheny

Junior Membership

Steimer, J. T., Sr. Highway Forester, Dept. of Highways, Pa.; Pa. State, B.S.F., 1949. H. H. Chisman, H. N. Cope, V. Beede.

Zimmerman, J. B., Tbr. Farming, Stoystown, Pa.; Pa. State, B.S.F., 1936. Reinstatement.

Appalachian

Junior Membership

Fromme, J. T., Forester, U.S.F.S., Marion, Va.; Pa. State, B.S.F., 1947. P. R. Cochran, P. W. Sundheimer, K. W. McNasser.

Ordel, A. W., Jr., Forester, Va. Forest Service, Charlottesville, Va., V.P.I., B.S.F., 1947; Duke, M.F., 1949. S. G. Hobart, C. J. Witter, G. W. Dean.

Perkins, E. G., Forester, T.V.A., Asheville, N.C.; Mich. State, B.S.F., 1948; Duke, M.F., 1949. H. R. Pine, R. A. Vogenberger, B. H. Corpening.

Central Rocky Mountain

Junior Membership

Beckman, J. H. Asst. Rgr., U.S.F.S., Denver, Colo.; Yale, B.S., (Botany), 1947; M.F., 1948. W. M. Tracy, B. B. Whipple, F. R. Johnson.

Lonsinger, W. F., Forester, U.S.F.S., Denver, Colo.; Colo. A & M., B.S.F., 1947. J. L. Deen, J. V. K. Wagar, C. H. Wasser.

Meines, M. K., Asst. State Forester, Game, Fish, and Parks, Pierre, S. Dak. Central Rocky Mountain.

Central States

Affiliate Membership

Sample, J. L., Farm Forester, 411 East Main St., Madison, Ind.; Purdue Univ., B.S., 1916. Central States.

Junior Membership

Auble, R. G., Farm Forester, Mich. Dept. of Cons., Lansing, Mich.; Mich. State B.S.F., 1941. P. A. Herbert, P. W. Robbins, K. Dressel.

Haitsch, L. J., 409 Willow Lane, East Lansing, Mich.; Mich. State, B.S.F., 1948; M.F., 1949. H. A. Stoehr, L. W. Gysel, P. W. Robbins.

Marlow, C. W., City Forester, Monroe, Mich.; Mich. State, B.S.F., 1948. P. A. Herbert L. W. Gysel, P. W. Robbins.

Shipman, R. D., Agric. Aide, Lake States Exp. Sta., E. Lansing, Mich.; Univ. of Mich., B.S.F., 1946; M.F., 1947. J. L. Arend, L. G. Engle, L. J. Young.

Columbia River

Junior Membership

Ehm, R. E., Forestry Aide, Willamette Natl. Forest, Eugene, Ore.; Oregon State, B.S.F., 1949. J. D. Snodgress, W. I. West, W. F. McCulloch.

Eubanks, W. B., Appraisal Engr., State Tax Comm., Salem, Ore.; Oregon State, B.S.F., 1946. R. C. Wilson, F. A. Johnson, F. L. Moravets.

Henshaw, J. F., Dist. Asst., Rogue River Natl. Forest, Medford, Ore. Columbia River.

Morey, G. W., Fire Control Asst., Siskiyou Natl. Forest, Grants Pass, Ore. Columbia River.

Prentice, Dale C., Forest Protection Engr., Western Pine Assn., Portland, Ore.; Univ. of Calif., B.S.F., 1948. C. O. Borsting, N. J. Orr, Jr., H. H. Ogle.

Thorpe, L. M., Forester, U.S.F.S., Vancouver, Wash.; Univ. of Wash., B.S.F., 1939. R. D. Hodges, Jr., L. O. Barnett, D. R. Gibney.

Gulf States

Junior Membership

Barnes, W. W., Forester & Mgr., Rice Land Lbr. Co., Houston, Texas; N.Y. State, B.S.F., 1929. Reinstatement.

Boehme, K. R., Navigation Instr., U.S.A.F., Ellington Air Force Base, Texas; Univ. of Mich., B.S.F., 1948. S. T. Dana, W. F. Ramsdell, S. W. Allen.

McDonald, C. R., Jr., Tbr. Estimator, Johns-Manville Prods. Corp., Natchez, Miss.; Univ. of Mich., B.S.F., 1948. W. L. Shetter, J. W. Thompson, C. H. Lewis, Jr.

Oilschlager, E. E., Tbr. Inventory, Gaylord Container Corp., Bogalusa, La.; Iowa State, B.S.F., 1949. T. E. Bercaw, W. H. Henderson, J. H. Foil.

Kentucky-Tennessee

Junior Membership

Butcher, G. L., Dist. Forester, Ky. Div. of Forestry, Frankfort, Ky.; Georgetown College, A.B., 1946; Duke, M.F., 1949. C. F. Korstian, R. B. Thomson, A. E. Wackerman.

Long, S. H., Forester, T.V.A., Norris, Tenn.; N.C. State, B.S.F., 1949. J. W. Lehman, R. Kilbourne, J. O. Artman.

New England

Junior Membership

Cothren, V. W., Student, Yale Univ., New Haven, Conn.; La. State, B.S.F., 1949. E. V. Zumwalt, H. H. Chapman, D. Cothren.

Wing, G. E., Asst. Mgr., Woodlands, Hollingsworth & Whitney Co., Waterville, Me.; Univ. of Me., B.S.F., 1926; Yale, M. F., 1928. Reinstatement.

New York

Junior Membership

Oettinger, F. W., Student, N.Y. State, Syracuse, N.Y.; N.Y. State, B.S.F., 1949. B. Stanton, J. C. Sammi, L. P. Plumley.

Northern California

Associate Membership

Johnson, Walter S., Pres. American Box Corp., San Francisco, Calif.; Hastings Law College, LL.B., 1914. Northern California.

Leopold, A. S., Asst. Prof., Zoology, Univ. of Calif., Berkeley, Calif.; Univ. of Wis., B.S., (Agric.), 1936; Univ of Calif., Ph.D. (Zoology), 1944. Northern California.

Junior Membership

Niles, J. R., Bookkeeper, Diamond Match Co., Roseville, Calif.; Iowa State, B.S.F., 1949. G. B. Hartman, L. F. Kellogg, G. W. Thomson.

Ozark

Junior Membership

Jamerson, L. W., Forest Mgmt, Pomeroy & McGowin, Monticello, Ark.; Univ. of Ga., B.S.F., 1949. Z. W. White, G. Stanley, R. R. Eastment.

Longsworth, T. W., Farm Forester, Mo. Cons. Comm., Jefferson City, Mo.; Mich. State, B.S.F., 1949. G. O. White, W. E. Towell, A. B. Meyer.

Puget Sound

Junior Membership

Miller, J. A., Partner, Hansen Bros. Logging Co., Hillsboro, Ore.; Univ. of Wash., B.S.F., 1937. G. D. Marckworth, J. K. Pearce, J. C. H. Robertson.

Southeastern

Affiliate Membership

Suttle, J. R., Logging Supt., Vredenburgh Saw Mill Co., Vredenburgh, Ala. Southeastern.

Junior Membership

Ennis, J. J., Forester-Mgr., Ga. Forest Farms, Inc., Washington, Ga.; Univ. of N.H., B.S.F., 1931. F. A. Albert, J. F. Brooks, C. F. Evans.

Faris, E. T., Asst. Forester Research, Ga. Exp. Sta., Experiment, Ga.; Univ. of Ga., B.S.F., 1949. A. E. Patterson, L. W. R. Jackson, G. N. Bishop.

Greene, M. F., Forester, Ocala Mfg. Co., Ocala, Fla.; Univ. of Ga., B.S.F., 1949. A. E. Patterson, A. Worrell, L. Hargreave, Jr.

Morgan, R. A., Tbr. Cruiser, Natl. Turpentine & Pulpwood Corp., Jacksonville, Fla.; Univ. of Fla., (2 yrs.). Southeastern.

Rawls, M. G., Mgr., St. Regis Paper Co., Fargo, Ga.; Reinstatement.

Sheppard, M. H., Grad. Asst., Univ. of Fla., Gainesville, Fla.; Univ. of Fla., B.S.F., 1949; M.S.F., 1950. P. W. Frazer, T. G. Herndon, E. A. Ziegler.

Smith, J. L., Grad. Student, Univ. of Ga., Athens, Ga.; Univ. of Ga., B.S.F., 1949. A. E. Patterson, A. Worrell, L. A. Hargreave, Jr.

Southwestern

Junior Membership

Rea, Russel E., Asst. Forest Supv., Coconino Natl. Forest, Flagstaff, Ariz.; Pa. State, B.S.F., 1933. Reinstatement.

Wisconsin-Upper Michigan

Associate Membership

Zimmerman, F. R., Supv., Wis. Cons. Dept., Madison, Wis.; Univ. of Wis., B.S., (Agric), 1934; M.S., (Botany), 1935. Wisconsin-Upper Michigan.

Junior Membership

Reinke, M. E., Forester, Wis. Cons. Dept., Madison, Wis.; Univ. of Mich., B.S.F., 1948. S. T. Dana, W. F. Ramsdell, S. W. Allen.

Smith, Diana M., Forester Research, U.S. Forest Products Lab., Madison, Wis.; Univ. of Edinburgh, B.S., (Forestry), 1947. Wisconsin-Upper Michigan.

The following have been Junior members for at least 6 years and are eligible for automatic advancement to Member grade. The Sections have certified them as actively engaged in forestry work and competent to represent the profession honorably and capably in the performance of their duties.

New York

Willsie, Robert L., Soil Cons., U.S.S.C., Jamestown, N.Y.

Southeastern

Wilson, H. A., Clancey Lbr. Co. Grayson, Ala.

Washington

Dodd, Jack B., 9021 Sudbury Rd., Silver Spring, Md.

Forestry News

Compiled by ROBERT D. HOSTETTER, *Assistant Executive Secretary*

Florida Forestry Council Coordinates Research Efforts

Formation of the Florida Forestry Council was completed at a meeting at Lake City, Fla. on November 29, 1949.

Organized to coordinate research efforts, the council will assist in the solution of practical problems of forest conservation, management, silviculture, and forest products processing.

Frank Rasor of Tallahassee, supervisor of national forests in Florida, was elected chairman of the council. Vice chairman is State Forester C. H. Coulter, and Charles G. Geltz, School of Forestry, University of Florida, was elected secretary-treasurer.

Membership is by invitation and includes representatives from conservation, wildlife, and cattlemen's associations; forest and agricultural experiment stations; timber, paper, pulp, and naval stores industries; state extension and vocational education divisions; and federal and state forest services.

The next meeting of the Florida Forestry Council will be on May 16.

Hercules Builds Pilot Plant

Hercules Powder Company is constructing a pilot plant in Klamath Falls, Ore. for the study of the chemistry of western woods, according to A. E. Forster, a director of the company.

The chemical company has purchased from the Weyerhaeuser Timber Company a small property of approximately 50 acres, and including several small buildings, a power house, railroad sidings, fire lines, and a water tower.

Hercules Powder Company has been conducting research on western woods for the past two years, but further process research is planned at the new location.

Hercules will make use of experience in the extraction of chemicals from pine wood gained in the Southeastern United States in determining the feasibility of extracting organic chemicals from western woods.

Collingwood Changes Jobs

G. Harris Collingwood, who recently completed an assignment in the Department of Natural Resources, U. S. Chamber of Commerce, is now conservation economist in the legislative reference section at the Library of Congress, Washington, D. C.

Cypress Extends Range

In 1940 L. E. George, forester for the William Bonifas Lumber Company, Neenah, Wis., gave some cypress seeds to his father, above, who planted them at his home in Uniontown, in southwestern Pennsylvania. After nine growing seasons the trees are ten feet high and two inches in diameter, although beyond their ordinary range.

Rockefeller Deeds Jackson Hole Lands to Public

John D. Rockefeller, Jr. on December 16 deeded 33,562 acres of land within the boundaries of Grand Teton National Park and Jackson Hole National Monument to the people of the United States. Secretary of the Interior Oscar L. Chapman accepted the lands on behalf of the federal government and the National Park Service, the bureau which will administer them.

Over two million dollars was involved in acquiring and maintaining the lands during the past quarter of a century. Mr. Rockefeller has contributed more than ten million dollars additional in procuring lands for other national parks and in preserving the coastal redwoods in California state parks.

Coronet Congratulates Watts

An article titled "Forester Watts: Guardian of Our Land" in the January issue of *Coronet* magazine told of some of Lyle F. Watts' experiences as Chief of the U. S. Forest Service, including some dealing with the stock reduction problems on western ranges, with fire control, and with other national forest management problems.

The article was one of a series paying tribute to "Great Living Americans."

Murphy Develops Inter-Agency Land Management Programs

Warren T. Murphy has been appointed a field representative of the U. S. Department of Agriculture in the Colorado River Basin and Inter-Mountain Area, with headquarters at Salt Lake City, Utah. He will represent the Department on the Pacific Southwest Federal Inter-Agency Technical Committee. Mr. Murphy will also aid the several bureaus and services of the Department in the development of comprehensive and related programs, touching on all phases of farming, land management, and water resource conservation in the region.

Mr. Murphy was formerly general inspector on the staff of the Chief of the U. S. Forest Service.

Operates 91 Hunting Grounds

Wisconsin is now operating 91 public hunting grounds, a total of 271,062 acres, of which 221,371 acres are leased and the rest in state ownership. These areas not only provide a free place to hunt but make land available for game management. A total of 238,725 conifer trees and 31,625 game food plants were put out on the areas during 1949 in a continuing program of making them more appealing for wildlife.

DeMoisy Heads Institute

Appointment of Ralph G. DeMoisy as acting technical director of the Washington State Institute of Forest Products was announced by the Forest Products Commission of the state following the resignation of O. Harry Schrader in December.

DeMoisy has been on the Institute staff since last summer as executive assistant. He formerly was assistant professor of forest engineering at Oregon State College.

Pulpmills Have Forestry Stake

The 13 pulpmills served by the Seaboard Air Line Railroad in Virginia, the Carolinas, Georgia, and Florida use 10,638 cords of pulpwood daily, ship 2,056,455 tons of products yearly, will provide 20,550,000 seedlings to plant their own or other land this season, have constructed or reworked over 18,000 miles of fire lines during the past year, and currently employ 145 foresters, according to R. N. Hoskins, Seaboard's forester.

Forestry Legislation

On December 19, President Harry S. Truman by Executive Order banned airplane flights below 4,000 feet over the roadless areas of the Superior National Forest in northern Minnesota. The order will go into effect on January 1, 1951, as far as general flying of private and commercial planes is concerned. After January 1, 1952, the private resorts within the airspace reservation no longer can be served by air.

The President's action was hailed by conservationists as another step toward the establishment of an International Peace Memorial Forest in the Quetico-Superior wilderness canoe country.

Nebraskans Devise New Way To Encourage Conservation

Bankers of Nebraska last year organized the Nebraska Conservation Foundation, Inc. to assist the people of their state in re-building their natural resources. When the U. S. Department of Agriculture pointed out that three-fourths of the 20,000,000 acres of cropland in the state was moderately or seriously eroded, the banking interests realized the seriousness of the situation and decided to do something about it.

This unique foundation devotes its efforts toward the education not only of farmers but of people in towns and cities, too, as to methods of conserving topsoil and raising better crops.

W. J. Coad of Omaha, one of the founders of the organization, says that bankers organize community groups which discuss with farmers the best farming practices that can be applied on each and every farm, the financial assistance needed by each farmer, the establishment of tree plantings, the conversion of certain land into pastures, and the use of terraces and contour cultivation.

Improvement Methods Compared

"Timber Stand Improvement in the Southern Appalachian Region" by George M. Jemison and George H. Hepting of the Southeastern Forest Experiment Station, Asheville, N. C., emphasizes early treatment and an intensity of application commensurate with the soil's productivity.

Results of various C.C.C. stand improvement methods were studied to determine which methods could be expected to be profitable.

Youths Win Scholarships

National recognition was earned by four farm forestry youths at the 28th National 4-H Club Congress in Chicago on December 1, where each was awarded a $300 scholarship and an all-expense trip to the Congress.

The four winners, above, are: James Barnes, 17, Prescott, Ark.; Marvin Gegre, 17, Florence, Mont.; Terry Johnson 16, Ogema, Wis., and Laurence G. Hallock, 19, Sidney Center, N. Y.

The forestry contest is sponsored by American Forest Products Industries, Washington, D. C., in conjunction with the National Committee on Boys and Girls Club Work, and is conducted with the cooperation of the state and county extension workers and 4-H Club leaders, in participating states.

New Methods Revealed During 1949 Christmas Tree Harvest

Mobile two-way radios, a tree so large that two trucks were required to haul it, and the Polk County cut-it-yourself-plan all were featured in the recent Christmas tree harvesting season in the Northwest.

Herbert Grell of Shelton, Wash. and Loren Tucker of Port Orchard, Wash. were two foresters who used radios to enable them to speedily apprehend persons cutting trees illegally. Culprits caught were given the chance to pay one dollar per tree cut, knowing that if taken to court they might be fined as much as three dollars per tree plus $100 fine or 30 days in jail, or both, for trespassing.

Bellingham, Wash. determined to procure the largest Christmas tree ever to be erected. A Douglas-fir tree 153 feet tall was cut and hauled atop two huge logging trucks in tandem to the center of town where it was decorated in the Christmas spirit.

The Dallas, Ore. Chamber of Commerce sponsored a plan in Polk County whereby farm woodland cooperators listed lands where the public could harvest their own Christmas trees without damage to growing tree farms. The farmers were paid a small price per foot for all trees cut.

Forest Service Invites Colorado Pulptimber Bids

Four and one-half million cords of pulpwood located in western Colorado on the White River, Routt, Grand Mesa, and Uncompahgre National Forests is currently being advertised for sale by the U. S. Forest Service. This is the largest offering of national forest timber ever made in the continental United States.

Terms of the proposed sale call for the establishment of a pulp plant with a capacity of at least 200 tons a day on the western slope of Colorado's Rocky Mountains where the timber is located. It is estimated that the pulpmill will cost approximately $15,000,000 and the operations as a whole will employ at least 600 persons. Raw material for this industry, the first of its kind to be set up in the state, will be provided by 3,325,000 cords of beetle-killed Engelmann spruce and 1,240,000 cords of green spruce and pine included in the sale. The Forest Service estimates that this wood is more than sufficient to supply a pulp plant at the required capacity for 30 years, the duration of the contract. The timber productive capacity of adjoining western slope national forest lands is sufficient to maintain the mill in perpetual operation.

While the stumpage price for the initial five-year period will be established by the high bid at an auction to be held in Washington on March 29, 1950, these rates are subject to readjustment at five-year intervals.

Copies of a prospectus containing the proposed pulp-timber agreement, a copy of the published advertisement, a map and other information regarding the area, the character of the timber and the conditions of sale may be obtained from the U. S. Forest Service, Post Office Building, Denver 2, Colo.

Kiln Course Scheduled

A kiln drying short course is scheduled for the week of February 6 at North Carolina State College, Raleigh. It is sponsored by the Division of Forestry and the Southern Furniture Manufacturers Association.

Subjects to be covered include stacking procedures, kiln construction, schedules, and other operational problems.

Instructors will be Edward Rasmussen, Walton R. Smith, and Roy M. Carter.

Potlatch Assists 4-H Foresters

Potlatch Forests, Inc., of Lewiston, Idaho, is providing assistance in three ways to 4-H Club members who are interested in forestry. Each spring the industrial forestry company holds 4-H tree planting field days at each of its three mills in northern Idaho; scholarships are maintained at the University of Idaho; and Royce Cox, chief forester for P.F.I., leads a 4-H Forestry Club at Lewiston.

According to Vernon H. Burlison, assistant extension forester at Moscow, Idaho, Potlatch cooperates with the University of Idaho Agricultural Extension Service in training 4-H Club members in reforestation and forest management by preparing planting sites and by caring for the trees after they have been planted by the boys and girls. Lumberjack meals are also provided the 4-H members by the company. The dozen boys in Mr. Cox's club have planted 1,100 trees in the Craig Mountain area.

Forestry awards made by Potlatch Forests, Inc., include a $100 scholarship awarded annually to the state winner in 4-H forestry, four $25 scholarships to the 4-H Short Course held on the University of Idaho campus each spring, and fellowships for research in the field of wood utilization.

Radar Throws Ducks Off Beam

Scientists may be a step closer to solving the age-old mystery of bird migration as the result of experiments conducted with radar at the Delta Waterfowl Research Station maintained by the Wildlife Management Institute and Mr. James F. Bell of Minneapolis on the Manitoba breeding grounds.

Although H. Albert Hochbaum, director of the station, feels that experiments still are in such an early stage that no particular significance can be placed on results, interesting reactions of migrating ducks to radar beams have been noted. Portable radar equipment borrowed from the R.C.A.F. was used last spring to help trace the migration of birds. When high-flying flocks of ducks struck the radar beam, they reacted in a peculiar manner. "We obtained at least a dozen positive reactions when the birds flared and broke, much as if they had been shot, when they hit the radar beam," Hochbaum reports. "The birds appeared to become momentarily confused in their flight, then they would regroup and continue on their way." Only migrating birds seemed to be affected.

Recreationists' Pack Stock Give Meadows Heavy Use

An increased number of saddle and pack trips by recreationists has resulted in heavy use of high country meadows in several national forests. Among those seriously affected are the Inyo, Sequoia, Sierra, and Stanislaus in California and the White River in Colorado.

In most instances U. S. Forest Service officials are able to prevent damage by rotational use of popular areas, diversion of groups to areas off the beaten track, elimination of cattle and sheep from meadows adjacent to campgrounds, and by assisting vacationists to schedule their trips when they will not be in conflict with others. In some instances it is necessary that hay be packed in for pack and saddle stock feed.

Development of additional trails would aid in dispersing the use intensity but sufficient funds for that purpose are lacking.

Float Fishers Invade Missouri

"Floating and Fishing" is a new 20-page booklet issued by the Missouri Division of Resources and Development describing the types of angling possible within the state's boundaries. These vary from trout fishing in three state parks to bass fishing in many lakes and streams. Other species of game fish include crappie, jack salmon, bluegill, catfish, and others.

Major emphasis is given to float fishing, by which method fishermen from every state in the Union—and Canada as well—try their skill as they drift down a Missouri stream. Commercial guides are available to do the cooking and as much paddling as is necessary.

Minor Products Contribute

Minor forest products are contributing to the sustained yield operation of the Port Blakely Mill Company's extensive land holdings, according to Jack Winn, forester. Christmas trees and huckleberry brush, used by florists for decorative purposes, are being harvested and sold.

Many years ago the company had the largest sawmill on Puget Sound. Although no longer operating the mill, the company is developing its properties for continuous production.

Manufacturers Seek Fuller Use

The Grand Rapids Furniture Manufacturing Association in Michigan is making furniture out of fabricated wood in an experiment which may eventually mean a 100 percent use of the tree.

The project involves a process of turning waste wood into a plasticized wood. The product can be used as a core stock to which veneered panels are applied.

Under present methods it is estimated that only about 12 percent of the lumber in a tree is suitable for quality furniture.

Fire Fighters Use Ski-Tow

The U. S. Forest Service has used almost every known means of transportation for fire fighters—horses, mules, automobiles, boats, airplanes, parachutes, helicopters, weasels—but the Mt. Waterman fire on the Angeles National Forest, September 16, brought into play a new mode of travel to forest fires. Some 50 fire fighters rode to an elevation of 8,000 feet by ski-tow! Then they decended by foot to 6,500 feet on the far side of the mountain to battle a six-acre fire burning in the open pine and brush stands. The fire was also serviced with equipment and food supplies by helicopter.

Plant Trees Economically

During the 1948-1949 season, the St. Regis Paper Company produced 5,300,000 seedlings in its nursery at a total cost of $11,268.18, or $2.13 per thousand. One million were given away to landowners in Alabama, Florida, and Georgia, and 4,300,000 were planted on approximately 5,600 acres of company-owned lands. The planting, by machine, cost $2.75 per thousand. The total cost for growing and planting amounted to $20,975.74, or $4.88 per thousand.

Air-Ground Markers Painted

To assist ground crews and aerial patrolmen in coordinating the location and attack of woods fires, the Louisiana Forestry Commission has painted markers on the roofs of barns in areas where few natural landmarks exist. The markers are eight-foot, yellow squares with a six-foot, block letter in each. The location of each marker is noted on all maps.

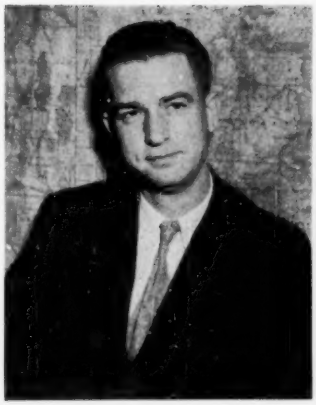
Personnel Shifts Announced

Several changes in assignments of U. S. Forest Service personnel have been announced recently. Most of these were effective January 1, 1950.

Dahl J. Kirkpatrick, who since 1944 has been in charge of the section of management and plans in the division of timber management at Portland, Ore., is now chief of the division of timber management at Albuquerque, N. M.

T. H. Van Meter, above, former assistant regional forester in charge of information and education in the Northern Region is now chief of operation in the Intermountain Region. He succeeds John N. Kinney who has retired.

Blaine Betenson, above, for the past seven years supervisor of the Fishlake National Forest has been selected as director of range reseeding and range improvements in the Intermountain Region.



W. W. Dresskell, above, with 19 years of diverse western forestry experience, has been appointed supervisor of the Bridger National Forest, Kemmerer, Wyo.

William J. Stahl, who has been in charge of state cooperative activities in the North Central Region is now engaged in the same type of activities on a national scope in Washington, D. C.

Ed Ritter, of Philadelphia, Penna., has taken over Stahl's job in Milwaukee.

Irvin M. Varner, above, has been promoted to succeed Edward P. Cliff as chief of range and wildlife management in the Intermountain Region. Mr. Cliff is now regional forester of the Rocky Mountain Region.

Boyd L. Rasmussen has been advanced from a staff position to supervisor of the Siuslaw National Forest, Corvallis, Ore.

Marion J. Webber, supervisor of the Harney National Forest during the past five years of his 31-year tour with the Forest Service retired on December 31.

J. T. Mathews, above, former supervisor of the Payette National Forest, is now assistant chief of operation in the Intermountain Region.

Laurence G. Jolly, assistant supervisor of the Mount Hood National Forest, has been named supervisor of the Rouge River National Forest in the Pacific Northwest Region.

Charles I. Daugherty, above, has been transferred from his position as supervisor of the Targhee National Forest to that of supervisor of the Sawtooth National Forest in Idaho. He succeeds Frank S. Moore who retired after 41 years of public service.

Arkansas Forestry Festivals Select Five State Champions

The seventeen Forestry Festivals sponsored in 1949 by the Arkansas Division of Forestry were attended by more than 40,000 people.

Features of the afternoon programs were various contests, including five events in which state champions were determined. The records established in those were: men's crosscut sawing (12-inch red oak)—12.8 seconds, women's crosscut sawing (10-inch red oak)—15.5 seconds, men's log chopping (10-inch red oak)—56.2 seconds, women's nail driving (3 nails in a gum log)—4.1 seconds, and women's shoe kicking—68 feet 10 inches.

Evening programs consisted of amateur talent, talks, awarding of prizes, and the showing of the movies "Fire Call" and "Southern Hardwoods—Yours Forever."

The Arkansas Division of Forestry considered the festivals so sucessful in furthering forest fire prevention and forestry educational work that the number will be increased this year.

Lindh Heads Southwest Region

Otto Lindh was promoted in October to the position of regional forester of the U. S. Forest Service's Southwest Region with headquarters at Albuquerque, N. M. For the past three years he has been assistant regional forester there in charge of timber management.

He was born in Washington, received his forestry degree at Oregon State College and worked on several national forests in the Northwest as well as in the regional office there, before being transferred to the Southwest.

Campers Fight Soil Erosion

In Capetown, Union of South Africa a new plan is under way to mobilize the people of the city for the fight against soil erosion. Camping trips are arranged with transportation, tents, food, and equipment provided free of charge. The campers, in turn, help build soil conservation works under the supervision of expert engineers. The plan permits many Capetowners to enjoy a camping trip while, at the same time, they perform a useful service.

Heads Forestry Research

Oliver D. Diller, above, has been promoted to the chairmanship of the department of forestry in the Ohio Agricultural Experiment Station at Wooster. He will be in charge of forestry research, succeeding the late Edmund Secrest. He will also continue as associate professor of forestry at Ohio State University. Last summer he attended the Third World Forestry Congress at Helsinki, Finland, and visited European forest research institutions.

The Secrest Arboretum at Wooster is now under the supervision of Dr. Diller, also.

TVA Thins Pine Plantations

Pine thinning studies, experiments with an electric dry kiln, a tannin-from-oak-slabs study, development of superior black walnut strains, results of fire control demonstrations, and other projects are described in the 1949 annual report of the Division of Forestry Relations, Tennessee Valley Authority.

A conclusion of the report is that "People are responding to the program of education-through-demonstration."

Woodlands Produce Basket Logs

"The Illinois Veneer Container Industry," Bulletin 534 of the University of Illinois Agricultural Experiment Station, states that the 12 veneer mills in and near Illinois annually purchase forest products valued at more than $225,000 from woodland owners in southern and west-central Illinois.

C. S. Walters is the author of this 42-page, illustrated bulletin describing Illinois' manufacturers of baskets, boxes, and crates.

John B. Taylor, after more than 35 years of service, has retired from the Forest Service. His most recent position was that of personnel officer in the North Central Region, Milwaukee, Wis.

Photogrammetry Field School Conducted in California

During the week of November 14 to 19, 1949, the School of Forestry of the University of California, in cooperation with the U. S. Forest Service, presented a special field school in forest photogrammetry for practicing foresters at the Feather River Experiment Station on the Plumas National Forest. The school was attended by 23 delegates from within the state, the largest number of which were from private industry. Federal and state agencies were also well represented.

Instruction covered a number of important forest uses of aerial photos including planimetric and topographic mapping, vegetation and timber type mapping, timber volume and growth estimation, construction of aerial photo mosaics, and uses of aerial photos in the fields of forest protection and forest recreation.

Robert N. Colwell, assistant professor of forestry at the University of California, was in charge of the instruction and was assisted by Kenneth E. Bradshaw of the California Forest and Range Experiment Station.

It is the intention of the School of Forestry of the University of California to present such a field school for practicing foresters annually. The The subject matter will be varied from year to year in accordance with demands for latest information in fields which are of greatest interest to practicing foresters throughout the State.

Educational Material Available

A bibliography of "Educational Material on Forestry & Forest Products Available from Industry Sources" has been prepared by American Forest Products Industries, Inc., Washington, D. C. Copies of the bibliography are obtainable from that organization.

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Gum Naval Stores Loan Program Announced for 1950 Crop

A price-supporting loan program for gum naval stores of the 1950 crop was announced on November 30 by the Production and Marketing Administration of the U. S. Department of Agriculture. Commodity Credit Corporation loans will be made available through December 31, 1950, on eligible naval stores produced in the calendar year 1950, through the American Turpentine Farmers Association Cooperative of Valdosta, Georgia. Loans will be available to producer-members who cooperate in the 1950 Gum Naval Stores Conservation Program or otherwise follow good conservation practices as determined by the U. S. Department of Agriculture.

The support level will be 60 percent of parity value of the gum naval stores production unit of 50 gallons of turpentine and 1,400 pounds of rosin. This value will be computed as of April 1, 1950, the beginning of the 1950-51 marketing season.

Under the 1949 loan program the support price was $114.08 per production unit, 80 percent of parity at the time of announcement of the program.

Western Radio Committee Named

At a meeting of members of the western region of National Forest Industries Communications at Seattle on November 14 bylaws were adopted, the executive committee for 1950 was elected, and responsibilities of the organization were discussed by Robert W. Olin, chairman.

Serving on the 1950 committee will be R. W. Olin, E. T. Clark, A. Whisnant, T. W. Collins, G. J. Schafer, Oscar Levin, Waldron Hyatt, Paul Sanders, Clyde S. Martin, and Lewis Simpson.

Primary objectives of the organization are to coordinate the use of radio by the forest industries, assist individual firms in the selection and use of radio equipment, and to serve as a "clearing house" between the Federal Communications Commission and users of radio equipment in forestry operations.

Laurence O. Barrett has been appointed supervisor of the Gifford Pinchot National Forest. After Forest Service experience in the South he returned to Washington in 1945 as staff officer of the forest he now supervises.

Heads Texas Association

L. L. Bishop, above, was appointed executive secretary of the Texas Forestry Association last November. He is a graduate of the University of Nebraska.

Now retired from the U. S. Forest Service, Mr. Bishop went to Texas in 1934 where he organized the national forest program, negotiating the purchase of 695,000 acres of timberland for four national forests.

Recently he returned from Japan where for two years he was head of the Resources Branch, Forestry Division, on General Douglas MacArthur's staff.

Conversion Surplus Method Used to Choose Best Product

A simple method of determining the most profitable products to take from a tree, once the decision has been made to cut the tree, is the subject of Occasional Paper 114, newly released by the Southern Forest Experiment Station. By this method—which is adaptable to a wide variety of timber operations—each section of the tree is assigned to the use which will give the greatest surplus of sale value over the direct costs of production. A feature of the method is that overhead costs are excluded from the calculations.

Sam Guttenberg and William A. Duerr are authors of this 18-page booklet which includes a nappendix of cost data for southern pine harvesting.

Riley Selects Select Peelers

John D. Riley is in charge of the selection, grading, and scaling of monthly shipments of select fir peeler logs to be supplied by the Union Lumber Co., Fort Bragg, Calif. to the Coast Plywood Manufacturing Co., Calpella, Calif.

Mr. Riley is president of Forest Products Industries, an organization in Mendocino County.

Boyce Goes to Europe

J. S. Boyce, professor of forest pathology at Yale University, will be in Europe from February to September, 1950, on sabbatic leave. He is an honorary president of the Seventh International Botanical Congress, which will be held in Stockholm, Sweden, July 12 to 20. A part of the time while in Europe Dr. Boyce will represent the Division of Forest Pathology, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture. In this capacity he will observe the susceptibility of American tree species to diseases occurring in Europe. This is part of a program being developed for detecting dangerous exotic diseases before they reach the United States.

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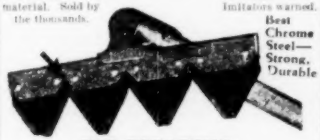

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Specializing in the Pines

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BALDWIN - GEORGIA

R. E. Rendall (1892-1949)

Raymond E. Rendall, 57, former state forest commissioner of Maine, died at his home in Augusta on December 24, after a long illness.

RAYMOND E. RENDALL

Born in Raymond, N. H., September 29, 1892, he received his Bachelor of Science degree in forestry at the University of Maine in 1916 and his Master's degree at the Yale Forest School in 1920.

He was Maine's Forest Commissioner from 1939 to 1948 when he became a consultant forester. A member of the Baxter State Park Authority, he was the first chairman of the New England Council conference of forestry officials an dsecretary of the national Association of State Foresters.

Axel H. Oxholm (1891-1949)

Axel H. Oxholm, 58, died following a heart attack on December 9. Mr. Oxholm, an internationally known leader in wood utilization, had recently returned to Washington, D. C. from an assignment for the Commerce Department in the Virgin Islands.

A native of Norway, he came to the United States in 1914 and was naturalized in 1921. During the first world war he was a lumber purchasing officer and in the second world war he directed some of the wood-cutting operations in Normandy.

At one time he was managing director of Pacific Forest Industries in Tacoma, Wash.

Hhe had been decorated by Sweden, Norway, Finland, France, and the United States for his work in forestry.

CFFPC Signs Jelly's Knotheads

Jelly Elliott and The Three Knotheads took to the air over some 500 radio stations for a 13-week period starting in January. Their 15 minute, once-a-week programs feature true hill-billy music and the unique patter of Jelly Elliott who combines his musical talent with forest philosophy.

The Jelly Elliott programs represent a new approach in the drive to reduce man-caused forest fires throughout the South and parts of the East. They have been released as a special feature of the Cooperative Forest Fire Prevention Campaign, which is conducted by state foresters and the U. S. Forest Service. The recordings were produced in Beaumont, Texas, several weeks ago under joint supervision of Bill Bergoffen, in charge of radio and television in the Washington Office of the U. S. Forest Service; Jim Kitchens, Jr., chief of the information and education branch of the Louisiana Forestry Commission; and Winfield Adams, chief recording engineer for the U. S. Recording Company, Washington, D. C.

S.B. Show Retires from FAO

The Chief of the Forestry Branch of FAO's Division of Forestry and Forest and Forest Products, Stuart Bevier Show, retired from active duty with the Division on September 30, 1949. Although he has returned to his home in Palo Alto, Calif. he will continue to act as a consultant and will carry on other part-time work for the Division which has headquarters in Washington, D. C.

For 36 years he had served continuously in various posts in the U. S. Forest Service, and was a regional forester during the 20 years from 1926 until 1946 when he joined FAO.

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Forest Service Report Stresses Research Work

More than 40 years of Forest Service research has resulted in saving millions of dollars for private industry and in the better management and use of forest resources, according to the annual report made public in December by Lyle F. Watts, Chief of the Forest Service, U. S. Department of Agriculture.

In the report Mr. Watts declares that public and private foresters are learning through organized research how to increase forest productivity and achieve more effective conservation. He sees tremendous possibilities for research work in the future.

Commission, Consultants Meet

On Thursday, November 10, a group of Consulting Foresters met with representatives of the South Carolina State Commission of Forestry at Columbia, S. C. for the purpose of planning a program of forestry assistance to the private timberland owners of the state. Correlation of the services performed by consulting foresters with those offered by the Commission of Forestry in order that more individual landowners could be assisted during any one year was the goal.

Consulting foresters Robert Knoth, Charleston, S. C.; William Milliken, Williston, S. C.; and S. S. Snook, Waterboro, S. C., were selected as a committee to meet periodically with representatives of the State Commission of Forestry and Extension Service for the purpose of discussing problems of mutual interest, State Forester Charles F. Flory reported.

Set Two Hundred Million Trees

A milestone in forestry progress was marked December 5 by a celebration at the Murray State College, Murray, Kentucky, in recognition of the planting of the two millionth tree in Calloway County and the two hundred millionth tree in the Tennessee Valley. More than 1,500 persons attended.

Private landowners in the Tennessee Valley will plant this winter and spring over 16,000,000 trees under the cooperative reforestation plan developed by valley state foresters, agricultural extension service, and TVA. Trees are available to any landowner within the Tennessee River watershed without cash charge. Since 1933, more than 152,000 acres of Valley lands have been reforested.

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Scattered Timber Cuttings Improve Moose Habitat

According to N. W. Hosley, in "The Moose and Its Ecology," it has been shown that old forests produce little browse available to moose. Cuttings in these stands result in greatly increased and more desirable forage, he says. Dr. Hosley recommends that cuttings should be scattered and continuing rather than over big areas at one time.

The 51-page Wildlife Leaflet 312 was published recently by the Fish and Wildlife Service. Dr. Hosley is in charge of the section of wildlife investigations on public lands.

Luoisianans Mark Arbor Day

Louisiana Governor Earl S. Long designated January 6 as Henry Hardtner Memorial Forestry Day. Marking the first anniversary of the KEEP LOUISIANA GREEN program, the day was celebrated in conjunction with Arbor Day.

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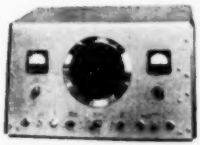

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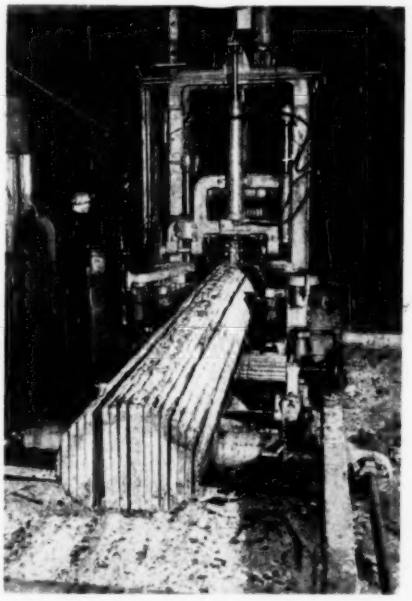

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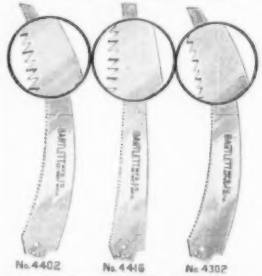

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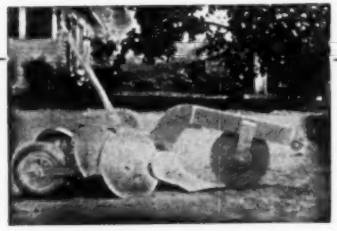

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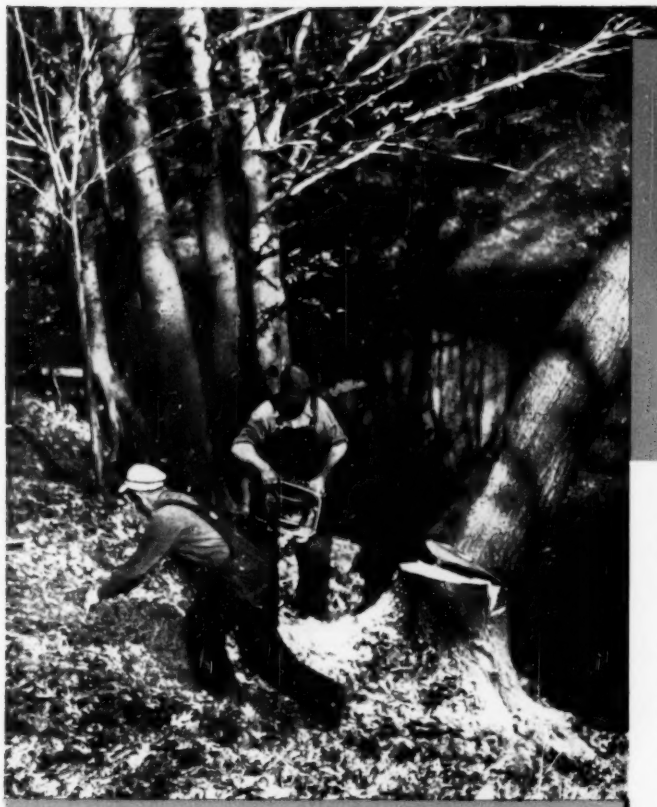

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